THE

AMERICAN GAS-LIGHT JOURNAL.

THE OFFICIAL GAZETTE OF

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

Rooms—No. 39 Nassau Street, cor. Liberty Street, opposite the Post-Office, New York.

LONDON:—TRUBNER & CO., No. 60 PATERNOSTER ROW.

VOL. IV.—No. 66. NEW-YORK, MONDAY, SEPTEMBER 15, 1862. $3 PER ANNUM.

HERRING'S PATENT

Champion Fire-Proof Safes.

Herring's Champion Burglar-Proof Safes, with Herring & Floyd's New Patent Crystalized Iron, the only metal which cannot be drilled.

Nearly 25,000 Herring's Safes have been made and sold, and over 500 have passed triumphantly through accidental Fires, thus fully sustaining their acknowledged and well-earned character as the "best Fire-Proof Safes the world ever saw."

Herring's New Patent Burglar-Proof Safes, made of a combination of Wrought Iron, Patent Crystalized Iron, and Bars of Steel, are confidently offered to the public as the strongest and best security against skilful burglars now extant.

It was a "Herring's Burglar-Proof Safe," the public will remember, which so lately held secure its trust against the determined ingenuity of the boldest and greatest mechanical burglars this country has ever known, and saved for the New York Exchange Bank no less than

HALF A MILLION OF DOLLARS.

Herring's Patent Fire and Burglar-Proof Safes *combined*, (one Safe within another,) making the most perfect protection from fire and thieves now known.

FIVE OF HERRING'S SAFES VICTORIOUS!

WELLSBORO', Penn., December 21, 1861.

Messrs. Herring & Co., New York:

Gentlemen,—At the great fire which occurred here on the 18th December last, my store, with a number of other buildings, was entirely destroyed; no less than seven places of business were burnt out and five of your safes severely tested, in every instance saving their entire contents, to the complete and perfect satisfaction of the owners. Two of your Herring's Patent Champion Safes which were in my building remained there through the entire conflagration, and were not opened until the day after the fire. No water was thrown on the building. Everything in my safe after the fire was nearly as good as new. C. L. Wilcox also preserved all his books, papers, and money in two of your safes, both being in same fire. Wm. Roberts was also the fortunate owner of another of your Patent Champion Safes, which was severely tested, and saved completely his books, papers, and money. The result has given great satisfaction, and we want no safe but Herring's Champion. Please send me one same size I last bought of you immediately. Send by N. Y. & Erie R.R. via Tioga depot. JOHN R. BOWEN.

I had two of Herring's Safes in above fire. They saved my books, papers, and $2,000 *in bank bills.* C. L. WILCOX.

HERRING'S PATENT CHAMPION saved my books, papers, and about $400 in *paper money.* I would use no other. WILLIAM ROBERTS.

GREAT FIRE IN PEARL AND FULTON STS.

NEW YORK, Jan. 27, 1862.

Messrs. HERRING & Co., No. 251 Broadway:

Gentlemen,—The large HERRING'S PATENT CHAMPION SAFE you made for me a few years ago has been put to a severe test in the great fire corner Fulton and Pearl sts., on the 26th inst., which entirely destroyed my building, together with many others.

The fire commenced about 6 o'clock on Sunday morning, and the safe was taken from the ruins after an exposure of more than thirty hours.

Your Safe contained all my books, insurance policies, and other valuable papers besides, gold and silver, bank bills, coupon bonds, &c., amounting to over Two Hundred Thousand Dollars. Everything in the Safe is in perfect order, except the binding of the books being steamed.

Your Patent Champion Safe gives us great satisfaction, and has guarded safely through the fire every dollar of its contents.

Truly yours, A. S. FOSTER.

GREAT FIRE IN NEW JERSEY.

NEW BRUNSWICK, N. J., January 18th, 1862.

Messrs. HERRING & Co.,

No. 251 Broadway, New York:

Gentlemen,—At the recent extensive fire in our city, on Wednesday morning last, 15th inst., I was the fortunate owner of one of your HERRING'S PATENT CHAMPION SAFES, which contained some books and a number of valuable papers.

The heat in my store was very great, and the safe subject to an intense heat. I felt great interest in the safety of my papers, as a number of castings in my store and within a few feet of the safe were melted. Nothing, indeed, was saved in my building, except the contents of your safe, which I am happy to inform you was completely preserved, after a thorough roasting for some seventeen hours. The result has exceeded my anticipations, and fully confirmed my confidence in the security of your Herring's Patent Safe. Please send me another of larger size, and refer all incredulous to my books and papers, which it gives me great pleasure to show.

WM. H. ARMSTRONG.

Herring & Co., 251 Broadway.
Farrel, Herring & Co., Phila.
Herring & Co., Chicago.

IRON FOUNDRIES.

BERGEN IRON WORKS, Established 1833.

R. A. BRICK, Manufacturer of CAST IRON WATER and GAS-PIPES. RETORTS, PIPES, &c., always on hand. Office, 109 Leonard Street, New York.

S. V. MERRICK, J. VAUGHAN MERRICK, W. H. MERRICK.

SOUTHWARK FOUNDRY, Philadelphia.

MERRICK & SONS, Engineers, Manufacturers of every description of Gas Machinery.

Retorts, Bench Castings, Condensers, Washers, Scrubbers, Wet or Dry Lime Purifiers, Coke Wagons, Fire Tools, Wrought Iron Grate Bars, Gasholders, either TELESCOPIC OR SINGLE, WITH SUSPENSION FRAMES COMPLETE; Wrought Iron Roof Frames, for Iron or Slate; Stop Cocks, Exhausters, Steam Pumps, Boilers and Tanks, Steam or Hand Air Pumps for proving Street Mains, Centre Seals, Governors, Wrought or Cast-Iron Lime Sieves for Purifiers, Purifier Hoisting Machines, &c., &c.

Address— MERRICK & SONS,
5th and Washington Streets, Philadelphia.

S. FULTON & CO., (Successors to Colwell & Co.) Manufacturers of Pig Iron and Cast Iron Gas and Water Pipes, also Heavy and Light Castings of every description, No. 207 North Water street and 206 North Wharves, Philadelphia.

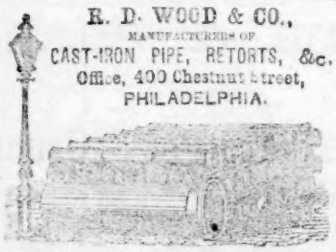
SAMUEL FULTON, THEO. TREWENDT.

TRAINER & MERCER, 117 NORTH Water Street, & 124 North Wharves, Philadelphia, AGENTS FOR THE MERCER FOUNDRY, AND ELK SHEET IRON WORKS.

CAST IRON STREET MAINS; *Bends, Branches, Chemical Retorts, and all kinds of Castings for* GAS-WORKS, either COAL OR ROSIN WORKS. SHEET IRON FOR GASOMETERS *cut and punched to order.* BOILER IRON *of all descriptions.* RUSSIA SHEET IRON, TIN PLATES, BLOCK TIN, COPPER, PIG LEAD, SPELTER, and Metals generally.

FLORENCE IRON WORKS.—The subscriber is prepared to execute orders and make contracts for Cast-Iron Water and Gas-Pipes, from 2 inches to 48 inches in diameter; also, Retorts, Bench-Castings, Branches, Bends, and all Castings for Water or Gas-Works. Pipes and Castings coated with Smith's Patent Coal Tar Varnish to prevent corrosion.

JOSEPH G. JONES,
205½ Walnut Street, Philadelphia.



R. D. WOOD & CO.,

MANUFACTURERS OF

CAST-IRON PIPE, RETORTS, &c.

Office, 400 Chestnut Street,

PHILADELPHIA.

TO GAS AND WATER COMPANIES:

The undersigned, Agent for Messrs. Thomas Edington & Sons, Phenix Foundry, Glasgow, Scotland, is prepared to contract for all descriptions of Cast-Iron Pipes of their manufacture.

About 6,000 tons of these Pipes have lately been supplied to the Brooklyn Water-works, N. Y., and the Chief Engineer of the Works, A. P. Kirkwood, Esq., is ready to testify to their excellent quality.

ARCH'LD BAXTER, 28 Beaver St., N. Y.

Sole Agent for the United States and Canada

THE ALPHA TUBE WORKS,

WALSALL, STAFFORDSHIRE.—Established 1830.

LAMBERT BROTHERS, Manufacturers of

LAP-WELDED BOILER TUBES, LOCOMOTIVE AND MARINE ENGINE FITTINGS, WROUGHT IRON WELDED PIPE, FOR STEAM OR HIGH-PRESSURE WATER AND GAS; HIGH-PRESSURE STEAM AND WATER VALVES,

FIRE & GARDEN ENGINE WORK, PUMPS, HYDRANTS, WATER-CLOSETS,

IRON AND BRASS GAS-FITTINGS, GASELIERS, &c.,

AND OF THE GROVE BEDSTEAD WORKS, WALSALL.

Delivery Free, in Liverpool, &c.

Catalogues post free.

A small *general* selection of current Manufactures for the Steam-engine, Water Supply, Gas-Works, Distilleries, Brewery, Chemical Works, Mills, &c., at the International Exhibition, Walsall Court, Class 31.

IRON FOUNDRIES.

MORRIS, TASKER & CO., PASCAL IRON WORKS,

[ESTABLISHED 1821.]

PHILADELPHIA, manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap-Welded Boiler Flues,

GALVANIZED WROUGHT IRON TUBES,

ARTESIAN WELL PIPES,

of Wrought or Cast-Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal Gas-works,; Cast-Iron Street Mains, Bends, Branches, Drips, &c.

GAS AND STEAM FITTERS' TOOLS, &c.

STEPHEN MORRIS, CHAS. WHEELER,
THOMAS S. TASKER. STEPHEN P. M. TASKER.

CAST IRON WATER, GAS, DRAIN AND HEATER PIPES, &c.,

COLUMBIA IRON WORKS,

OFFICE, No. 46 NORTH SEVENTH STREET, Below Arch Street, Philadelphia.

THOS. M. ADAMS, Proprietor.

S. S. ASHCRAFT, CINCINNATI, O., Manufacturer of Gas and Water-Pipes, with Branches of every description; Retorts for Gas and Oil Works; Gasholder Stands, Columns, &c.; Gas Purifiers, Condensers, and Gas Apparatus of all kinds; Foundry Work in general.

N. B.—A complete selection of Patterns on hand. Refer to any of the Gas-Works in the Western and Southwestern States.

THEODORE SCOWDEN, Engineer, Louisville.
JOHN JEFFREY, Civil Engineer, Cincinnati.
JACOB HOUGHTON, Engineer, Detroit.

WARREN FOUNDRY AND MACHINE CO., Phillipsburg, N. J. Manufacturers of Cast-Iron Pipes, from 2 to 48 inch diameter, all pipes from 3 inch to 48 inch cast vertically, and in dry sand, in lengths of 12 feet. 2 inch pipes in lengths of 7 feet. Special Castings of all descriptions furnished at short notice.

REFERENCES.

Croton Aqueduct dept., N. Y.
Manhattan Gas Lt. Co., N. Y.
Brooklyn Water dept., N. Y.
Brooklyn Gas Lt. Co., N. Y.
Citizens' Gas Lt. Co., Brooklyn, N. Y.

TO VERTICAL PIPE MANUFACTURERS.—WANTED, a situation as Foreman, or would prefer taking the work by contract, by a man that has had twenty years' experience in Vertical Pipe Moulding; also, has had some years' experience in Green Sand Moulding; best of reference given, by addressing FIRTH & INGHAM, Warren Foundry and Machine Shop, Phillipsburg, New Jersey.

PATENT-OFFICE NOTICES.

UNITED STATES PATENT-OFFICE,
WASHINGTON, April 17, 1862.

ON THE PETITION OF PHEBE Ann Fisk, Executrix, &c., of Almond D. Fisk, late of the City, County, and State of New York, praying for the extension of a Patent granted to the late Almond D. Fisk, Nov. 14, 1848, and re-issued March 6, 1860, for an improvement in Coffins, for seven years from the expiration of said Patent, which takes place on the 14th day of November, 1862.

It is ordered that the said petition be heard at the Patent-Office on Monday, the 27th of October next, at 12 o'clock m.; and all persons are notified to appear and show cause, if any they have, why said petition ought not to be granted.

Persons opposing the extension are required to file in the Patent-Office their objections specially set forth in writing at least twenty days before the day of hearing; all testimony filed by either party to be used at the said hearing must be taken and transmitted in accordance with the rules of the office, which will be furnished on application.

The testimony in the case will be closed on the 13th of October next; depositions and other papers relied upon as testimony, must be filed in the office on or before the morning of that day; the arguments, if any, within ten days thereafter.

Ordered, also, that this notice be published in the "National Republican," Washington, D. C., and "Tribune," New York, N. Y., once a week for three successive weeks; the first of said publications to be at least sixty days previous to the day of hearing. D. P HOLLOWAY,
Commissioner of Patents.

"NEW BOOKS." ANY OF OUR Readers who may require books on the subject of Gas-Light, Heat, Water, Sewerage, or other scientific matters, can be promptly supplied by addressing the Publisher of THE AMERICAN GAS-LIGHT JOURNAL, No. 39 Liberty st., New York.

COAL-OIL & CANDLES.

THE LUTHER ATWOOD OIL COMPANY'S

DEODERIZED

ILLUMINATING OIL,

Unsurpassed by any KEROSENE manufactured. Is nearly COLORLESS, of a PLEASANT ODOR, and burns without smoke, or crusting the wick. WARRANTED NON-EXPLOSIVE.

For sale in any quantity at a greatly reduced price.

Packed in cans and cases for foreign markets. Apply to U. TALLMAN,
34 Burling Slip, New York.

COAL OIL! COAL OIL!! of the celebrated brand of "SILVER SPRING." A superior burning oil, white, pure, safe, and odorless.

J. S. STANTON, Manufacturer,
No. 132 Malden Lane.

A LAMP CHIMNEY THAT WILL not break.—Made for the million.

The patent Mica Chimneys for coal-oil Lamps possess many advantages over the glass chimneys. They do not break from the heat, falling, cleaning, or any ordinary usage. When one is purchased it will last, with care, as long as the lamp. They fit all the burners now in use.

AMOS HORNING,
Agent for Manufacturer,
No. 321 North Second st.,
Philadelphia.

N. B.—Coal-Oil Lamps and Coal-Oil at low rates.

PATENTED OCT. 8, 1861.

Dithridge's Patent

OVAL LAMP CHIMNIES,

for Coal-Oil burners. Manufactured of

XX FLINT GLASS.

These chimnies are intended for the flat flame which, heating all parts of the glass equally, does not expose it to cracking.

E. D. DITHRIDGE,
Fort PittGlass Works,
Pittsburg, Pa.

THE LOVERS' LAMPS.—Price Five Shillings ($1.25) each. To supersede Candles and Night Lights. No Dressing or Trimming required.

EDMUND SPILLER,
Patentee,
98 HOLBORN-HILL, LONDON.
Post-Office orders attended to.

Ambrose's
PATENT
COAL-OIL, NO-CHIMNEY BURNER,

For Portable LAMPS, LANTERNS, Etc. Requires no Chimney.

Address,
J. E. AMBROSE,
249 Pearl st.,
New York, or
45 Newark Av.,
Jersey City, N. J.

AGENTS.—TO ALL WHO USE Candles.—The Candle Lamp just out. Safety and economy in light. No excuse for using explosive fluids. No dropping of tallow on carpets. The Candle Lamp will be sent free on receipt of 25 cents. Agents, male and female, can make a larger profit, and find a quicker sale for the Candle Lamp, than any article yet offered to the public. Send red stamp for illustrated circular.

WM. SUMNER, 208 Broadway, (room No. 10,) N. Y. city.

GAS THERMOMETERS FOR ascertaining and regulating the temperature of the gas while passing through the purifiers into the station meters. For sale at the Rooms of the AMERICAN GAS-LIGHT JOURNAL.

THE

STERLING GAS-REGULATOR,

Improves the Light and Saves a Large Per Centage of Gas.

MANUFACTURED BY THE

WHEELER & WILSON SEWING MACHINE COMPANY.

It is well known that Printers require the best and most brilliant light. In proof of the superiority of these Machines over all others, the following New York establishments are using them, and testify to their excellence:—New York Times, New York Herald, New York World, New York Tribune, New York Sun, Journal of Commerce, Courier & Enquirer, Evening Post, The Zietung, Dispatch, Leader, Scientific American, Advertiser and Spectator, Independent, Daily News, Harper's Monthly and Weekly, Transcript, Mercury, Atlas, Life Illustrated, Albion, Spirit of the Times, AMERICAN GAS-LIGHT JOURNAL, Christian Enquirer, Churchman, Church Journal, Christian Advocate, Christian Ambassador, Christian Intelligencer, Observer, Sunday Times, Sunday Courier.

By order of the New York and Brooklyn Common Councils, these Regulators are now used in the City Halls, Police Stations, Markets, and other Public Buildings in both cities.

They are Warranted by the

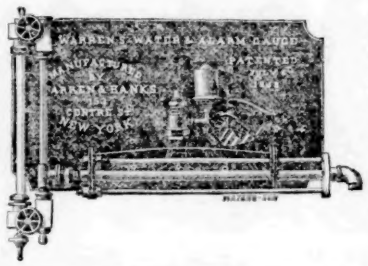
WHEELER & WILSON SEWING-MACHINE CO.,

505 BROADWAY, NEW YORK.

To keep in order, and always maintain the pressure of the Gas at the lowest point for a brilliant light and economical combustion. They are so constructed that *under no circumstances can the Mercury get into the Meters, or in any way injure them.*

WARREN'S PATENT WATER & ALARM GAUGE

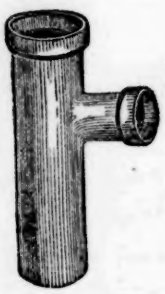
For Protecting the Flues and Preventing Steam-Boiler Explosions.



This is a reliable High and Low Water Detector, arranged so as to render it one of the best Water Gauges ever attached to a Steam-Boiler; always presenting before the Engineer at sight the exact height of the water, and if, by oversight or by sudden leakage, the water gets low in the boiler, it will cause an alarm before the water gets below the flues, thereby preventing an explosion. This Gauge can be made to alarm at any point desired as a High Water Detector, thereby preventing the water from getting to that height as to be forced into the cylinder of the engine, often causing serious accidents. Thus it is a High as well as a Low water Detector. For sale by

WARREN & BANKS,

153 Centre st., corner of Canal st., New York, Where a Gauge is constantly in operation.



GAS, STEAM, SMOKE,

PURE WATER & SOIL PIPE,

FROM

JOSEPH CLIFF

Wortley Fire-Brick Works, Leeds, England.

T. W. PARMELE, Agt.,

No. 4 Irving Place, N. Y.

JOHN RUSSELL & CO.,

PATENT TUBE MAKERS,

THE OLD TUBE WORKS, WEDNESBURY, AND THE ALMA WORKS, WALSAL, STAFFORDSHIRE,

69 UPPER THAMES ST., & 5 CHARLES ST., SOHO, LONDON;

AND 35 GRANBY ROW, MANCHESTER, ENGLAND.

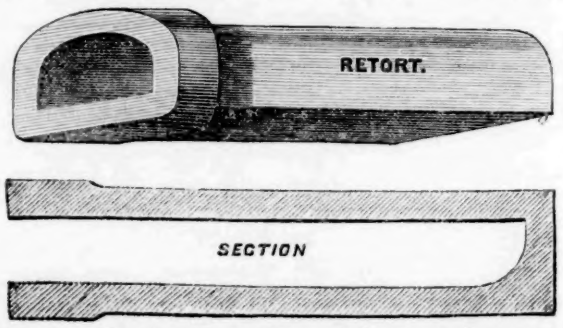
The original Manufacturers of WROUGHT-IRON GAS TUBES, and the Inventors of the Lap-welded Tubes for Locomotive and Marine Boilers. All kinds of TUBES and FITTINGS, whether for Gas, Steam, or Water. Galvanized and Composition Tubes. Chandeliers, and every kind of Brass work for Gas and Steam.

STOCKS, DIES, AND TAPS OF ALL SIZES. CAST-IRON PIPE AND GAS-METERS.

All Goods Warranted.

KING BROTHERS,

STOURBRIDGE, ENGLAND, FIRE-BRICK AND RETORT WORKS.



KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for Burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them

Free from Cracks and Correct in Form.

By great care in Manufacturing, combined with the advantages in Burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

RETORT OVENS, FIRE-BRICKS, GUARDS, SADDLES, RABITTED BURS, FLUES, AND QUARRIES, ARE ALL MANUFACTURED OF THE SAME QUALITY OF CLAY.

EVERY RETORT AND BRICK IS BRANDED "KING BROTHERS, STOURBRIDGE."

Apply to E. W. BARSTOW, 83 Maiden Lane, New York, where samples can be seen.

HARRIS & PEARSON,

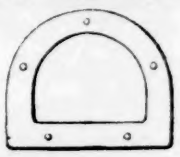
PROPRIETORS OF

Best Glass-House Pot & Crucible Clay.

Manufacturers of Fire-Bricks, Gas-Retorts, and Glass-House Furnace-Bricks of every description.

AMBLECOTE FIRE-CLAY AND BRICK WORKS, STOURBRIDGE, ENGLAND.

COWEN'S PATENT FIRE-CLAY RETORTS.



JOSEPH COWEN & CO.,

BLAYDON BURN, near Newcastle-on-Tyne, England,

Have always been, and are still, the most extensive manufacturers of FIRE-CLAY RETORTS in the United Kingdom, and were the only parties to whom a Prize Medal was awarded at the Great Exhibition, in London, 1851, for

"GAS RETORTS, AND OTHER OBJECTS IN FIRE-CLAY."

J. C. & CO. make Fire-Clay Retorts of all shapes and dimensions, and to fit existing mouth-pieces.

Orders for FIRE-CLAY RETORTS, TILES, BEARERS, and other articles in Fire-Clay, receive immediate attention, and are promptly executed at their Works, as above. Drawings of Settings adapted for Cowen's Patent Fire-Clay Retorts supplied.

AGENTS, MESSRS. MEAD & BELL,

13 CLIFF STREET, NEW YORK.

N. B.—J. C. & CO.'S RETORTS are well adapted for small Gas-Works, as they can be used without an Exhauster.

WHERE GAS-WORKS AND WATER-WORKS ARE WANTED.

We are now publishing regularly the names of the thirty thousand post-towns in the United States, so that builders of gas-works and water-works, and the various manufacturers, may see where are new openings for business. And as each post-master will receive several copies of the AMERICAN GAS-LIGHT JOURNAL, for distribution, the number thus circulated will probably exceed *Three Million Copies. What a chance for advertisers!*

POST-OFFICE TOWNS IN THE UNITED STATES,

ARRANGED BY STATES AND COUNTIES,

Showing where Gas-Works and Water-Works are Wanted.

VIRGINIA.

147 Counties, 1,785 Towns, 11 Gas-Works, 5 Water-Works.

(*Continued from page 67.*)

Highland County.

Clover Creek,	McDowell,	Palo Alto,
Doe Hill,	Meadow Dale,	Spruce Hill,
Head Waters,	Mill Gap,	Strait Creek,
Hightown,	Monterey,	Wilsonville.
	New Hampden,	

Isle of Wight County.

Barber's Cross Roads,	Carrsville,	Windsor Station,
Burwell's Bay,	Franklin Depot,	Zuni Station.
	Smithfield, (c. h.,)	

Jackson County.

Angerona,	Hemlock,	New Geneva,
Boggsville,	Jackson C. H.,	Pleasant View,
Elk Fork,	Le Roy,	Ravenswood,
Fisher's Point,	Moore's Mills,	Reedy,
Frozen Camp,	Murraysville,	Sandy,
Grass Lick Fork,	Muse's Bottom,	Wise.

James City County.

Burnt Ordinary,	*Williamsburgh* (c.h.)

Jefferson County.

Charlestown, (c. h.,)	Kabletown,	Middleway,
Duffields,	Kerneysville,	Rippon,
Halltown,	Leetown,	Shepherdstown,
Harper's Ferry,		Summit Point.

Kanawha County.

Blue Creek,	Jarrett's Ford,	Paint Creek,
Cannelton,	Kanawha C. H.,	Pocotaligo,
Carbonvale,	Kanawha Saline,	Shrewsbury,
Chesnut Hill,	Newton,	Sissonville,
Clendenin,	Osborne's Mill,	Tyler Mountain,
Coalsmouth,		Upper Falls of Coal.

King and Queen County.

Brulington,	Little Plymouth,	Shakleford's,
Carlton's Store,	New Prospect,	St. Stephen's Church,
Fleetwood Academy,	Newtown,	Stevensville,
King and Queen C. H.	Plain View,	Walkerton.

King George County.

Clifton,	Edge Hill,	Port Conway,
Comorn,	Hampstead,	Shiloh.
	King George C. H.,	

King William County.

Acquinton,	King William C. H.,	Mangohick,
Aylett's,	Lanesville,	Rumford Academy,
Enfield,		West Point.

Lancaster County.

Kilmarnock,	Litwalton,	Merry Point,
Lancaster C. H.,	Lively Oak,	White Stone.

Lee County.

Beech Spring,	Rose Hill,	White Oak Springs,
Cany Hollow,	Stickleysville,	Whitesburg,
Jonesville (c. h.,)	Turkey Cove,	Yokum Station,
Rocky Station,	Walnut Hill,	Zion's Mills.

Lewis County.

Alkire's Mills,	Fink's Creek,	Leading Creek,
Bennett's Mills,	Hacker's Creek,	Little Skin Creek,
Big Skin Creek,	Ireland,	*Weston*, (c. h.,)
Bush's Mills,	Jacksonville,	Wild Cat Run.
	Janelew,	

Logan County.

Chapmanville,	Logan C. H.,	Rich Creek,
Green Shoal,	Mouth of Pigeon,	White's Mills.
	Pigeon Trace,	

Loudoun County.

Aldie,	Hoylesville,	Oatland's,
Arcola,	Hughesville,	Philomont,
Belmont,	*Leesburgh*, (c. h.,)	Potomac Furnace,
Bloomfield,	Lovettsville,	Purcellville,
Bolington,	Middleburgh,	Round Hill,
Broad Run,	Morrisonville,	Snickersville,
Circleville,	Mount Gilead,	Unison,
Goresville,	Mountville,	Waterford,
Hamilton,	Neersville,	Whaley's Store,
Hillsboro',		Wheatland.

Louisa County.

Alto,	Harris',	Mechanicsville,
Ambler's Mills,	Jackson,	Poindexter's Store,
Belis Cross Roads,	Locust Creek,	Second Turn Out,
Cuckooville,	Locust Level,	South Anna,
Ellisville,	Long Creek,	Thompson's Cross
Fredericksh all,	Louisa C. H.,	Roads,
Gilboa,	Mansfield,	Tolersville,
Gum Spring,		Trevillian's Depot.

Lunenburg County.

Brickland,	Lochleven,	Pleasant Grove,
Columbian Grove,	Lunenburgh C. H.,	Rehoboth,
Double Bridge,	McFarland's,	Tussekiah,
Haleysburgh,	New Plymouth,	Wattsboro',
Laurel Hill,	Non Intervention,	Yatesville.
	Plantersville,	

McDowell County.

Dick's Creek,	Gilead Spring,	Peerysville.

Madison County.

Criglersville,	Locust Dale,	Peola Mills,
Dulinsville,	Madison C. H.,	Rochelle,
Graves' Mill,	Madison Mills,	Seville,
Leon,	Oak Park,	Wolftown.

Marion County.

Barracksville,	Farmington,	Meredith's Tavern,
Basnettsville,	Forksburgh,	Mill Falls,
Beaty's Mills,	Glover's Gap,	Nuzums,
Benton's Ferry,	Gray's Flat,	Palatine,
Bingamon,	Hoodsville,	Rivesville,
Boothsville,	Mannington,	Valley Falls,
Fairmont, (c. h.,)		Worthington.

Marshall County.

Adaline,	Fair Hill,	Rock Valley,
Beeler's Station,	Fork Ridge,	Rosby's Rock,
Bellton,	Glen Easton,	Sherrard,
Benwood,	Kossuth,	Slippery Ford,
Cameron,	Lynn Camp,	Wheeling Valley,
Dallas,	*Moundsville*, (c. h.,)	Woodland's.
	Rock Lick.	

Mason County.

Arbuckle,	Hartford City,	*Point Pleasant*, (c.h.)
Clover Valley,	Hereford's,	Upland.
Cologne,	Letart,	Upper Flats,
Deer Lick,	Mason,	West Columbia.

Matthews County.

Cobb's Creek,	Matthew's C. H.,	North End.

Mecklenburgh County.

Boydton, (c. h.,)	Lombardy Grove,	Shelton's Springs,
Cabbage Farm,	Marengo,	South Hill,
Christiansville,	Oakley,	Stony Cross,
Clarksville,	Palmer Springs,	Tanner's Store,
Drapersville,	Randolph Macon	Union Level,
Forksville,	College,	White House,
Joyceville,	Saint Tammany's,	Whittle's Mills.

Mercer County.

Bethel,	Flat Top,	Pipe Stem,
Camp Creek,	Frenchville,	*Princeton*, (c. h.,)
Deep Lick,	Jumping Branch,	Spanishburg,
East River,	Mercer Salt Works,	The Rock.

Middlesex County.

Church View,	Jamaica,	*Saluda*, (c. h.,)
Freeshade,	Locust Hill,	Sandy Bottom,
Harmony Village,		Urbanna.

Monongalia County.

Arnettsville,	Ice's Ferry,	*Morgantown*, (c. h.,)
Blacksville,	Jake's Run,	Pentress,
Cassville,	Jobe,	Pridevale,
Center,	Laurel Point,	Stewartstown,
Clinton Furnace,	Maidsville,	Uffington,
Fort Martin,	Miracle Run,	Wadestown,
Granville,		White Day.

Monroe County.

Egypt,	Mount Vernon,	Salt Sulphur Springs,
Gap Mills,	Mouth of Indian,	Sink's Grove,
Indian Creek,	Nickell's Mills,	Sweet Springs,
Johnson's Cross R'ds,	Pack's Ferry,	*Union*, (c. h.,)
Lindside,	Peterstown,	Wolf Creek,
	Red Sulphur Springs,	

Montgomery County.

Alleghany Spring,	Dry Valley,	McDonald's Mill,
Blacksburgh,	La Fayette,	Montgomery Springs,
Childress' Store,	Laurel Creek,	Shawsville,
Christiansburgh (c.h.)	Lovely Mount,	Shellville,
	Matamoras,	

Morgan County.

Alpine Depot,	Cherry Run Depot,	Sleepy Creek Bridge,
Berkeley Springs (ch)	Oakland,	Unger's Store,
Cacapon Depot,	Paw Paw,	Valley Mills.
	Sir John's Run,	

Nansemond County.

Australia,	Holy Neck,	Somerton,
Chuckatuck,	Kingsville,	South Quay,
Hargrove's Tavern,		*Suffolk*, (c. h.)

Nelson County.

Afton,	*Lovingston*, (c. h.,)	Robert's Mills,
Avon,	Martin's Mills,	Rock Fish,
Faber's Mills,	Massie's Mills,	Roseland,
Green Field,	Mount Horeb,	Tye River Warehouse,
Gulf Ford,	Murrill's Shop,	Variety Mills,
Hardwicksville,		Willow Bank.

New Kent County.

Barhamsville,	New Kent C. H.,	Slatersville.

Nicholas County.

Beaver Mills,	Kesler's Cross Lanes,	Sandrun,
Birch River,	Hookersville,	Snow Hill,
Fork Lick,	Nicholas C. H.,	Rich Woods,
Fowler's Knob,		Winston.

Norfolk County.

Churchland,	Hickory Ground,	North West River
Deep Creek,	Lake Drummond,	Bridge,
Great Bridge,	*Norfolk*, c. h.,)	Portsmouth.

Northampton County.

Bay View,	Eastville,	Johnsontown,
Capeville,	Hadlock,	Sea View.

Northumberland County.

Burgess' Store,	Lottsburgh,	Union Village,
Heathsville, (c. h.,)		Wicomico Church.

Nottoway County.

Blacks and Whites,	Forkland,	Nottoway C. H.,
Burksville,	Jeffress' Store,	Wellville.
	Jennings Ordinary,	

Ohio County.

Clinton,	Elm Grove,	West Liberty,
Coleman's,	Triadelphia,	*Wheeling*, (c. h.)
	Valley Grove,	

Orange County.

Barboursville,	Locust Grove,	Somerset,
Germanna,	Madison Run Station,	Thorn Hill,
Gordonsville,	Mallor's Ford,	Unionville,
Jackson's Shop,	Orange C. H.,	Verdierville.
	Orange Springs,	

Patrick County.

Ararat,	Meadows of Dan,	Round Meadows,
Avo,	Nettle Ridge,	Sandy Plains,
Clark's Creek,	Patrick C. H.,	Spabrook Station,
Elamsville,	Penn's Store,	Tuggle's Gap,
Mayo Forge,	Rock Castle,	Union Furnace.
	Rock Spring,	

(*To be concluded.*)

WATER-WORKS OF AMERICA.

LOUISVILLE, KY.

The fourth annual report of the Louisville Water Company has been received. The works have been in operation for over sixteen months, and have, during that period, performed very satisfactorily. Owing to the unsettled state of public affairs, and the proximity of the city of Louisville to the seat of active hostilities in the west, the patronage of the works has not been so great as it otherwise would have been. In the report of the President of the Board, the necessity of an enlarged consumption of water is urged, and if the works be patronized by the citizens to the extent which should be expected of them, a promising career would be insured. In reference to this, the report says:

The city of Louisville has issued bonds to the amount of $956,000 to build the water-works. The interest on these bonds has to be paid, either by direct taxation, or from the earnings of the works. The works cannot earn a revenue unless our citizens take the water. If the water is generally taken, we repeat, the revenue derived from the water rents will pay the interest; and if it is not generally taken, then the interest must continue to be paid by direct taxation. The least that ought to be done, in our opinion, is, to make the extension of the pipes general, and place the water within the reach of every property holder, and leave it optionary with him to receive water for the taxes he pays, or continue to pay his taxes and do without water, as he may elect. The works belong to our citizens. It is for them to patronize them and be entirely relieved of taxes, or refuse to patronize them and continue to pay the taxes, as heretofore, without deriving any benefit from them.

The report of the engineer gives so full and clear an account of the works, that, despite its length, we publish it in full. It will repay a careful perusal, and details the various parts of the works in a very interesting manner.

ENGINEER AND SUPERINTENDENT'S REPORT.

Louisville, Ky., Jan. 1st, 1862.

To the President and Directors of the Louisville Water Co.:

Gentlemen,—In conformity with the duties of the engineer and superintendent, I submit to you the following report upon the Louisville water-works.

During the past year, all important unfinished portions of the works have been completed; and as no final report, giving such general and special information as is customary, and believed to be due to the character and importance of the works, and to those who are most deeply interested, has been made, I deem it expedient, as well as my duty, acting in conformity with the suggestions in the last report of the chief engineer, to make a full and explicit report upon the location, construction, character, extent, operation, success, and cost of the Louisville Water-Works.

Location.—Assuming the court-house as a point of reference, believing it to be the most available or convenient locality for persons, both citizens and strangers, to refer to the distance, by the way of Main street and the Reservoir Avenue, to the reservoir is $3\frac{8}{10}$ miles, and from the reservoir to the engine-house $\frac{7}{10}$ of a mile, making a total distance $4\frac{1}{2}$ miles from the court-house to the engine-house, at the source of water-supply for the city of Louisville. The engine-house is located at the river shore, on land purchased from Mr. James Hewett, and the reservoir on land purchased from Maj. Throckmorton. The location is the most eligible one that the country in the vicinity of the city affords; possessing in combination all the essential and important qualities and characteristics that should determine the location of water-works; among which are an abundant and unfailing supply of water, purity of its source, and freedom from all contaminating influences, suitable elevation for reservoir in close proximity to the pumping machinery and the city, thereby insuring efficiency and economy in the practical operation of the works; all of which the location combines in an eminent degree.

Source of Supply and Inlet-pipe.—The water for the supply of the city is taken from the Ohio river $3\frac{540}{1000}$ miles (measuring along the shore) from the foot of Fifth street, being $1\frac{520}{1000}$ mile above the Beargrass cut-off, or city limits. The river from this point up stream, for a distance of three miles, has a perfectly clean bed

and shore on the Kentucky side, composed of small boulders, coarse gravel, and sand, and is washed at all stages of the river by a brisk and healthy current; the river at the point where the water is taken by the inlet-pipe, is eleven feet deep at the lowest stage.

The inlet-pipe is 50 inches inside diameter, made of boiler iron, scant ⅛ inch thick, riveted. It was made and put in, in sections varying in length from 12 to 22 feet; the joints being formed by male and female bands, riveted on the ends of the sections of pipe turned and bored to fit perfectly tight, and brought to place by means of lugs and screw-bolts on the outside. That portion of the inlet which extends into the river, is held in position by a strong caisson 32 by 70 feet, and 12½ feet deep at one end, and 3 feet at the other, constructed of timbers 12 by 12 inches, secured by drift and screw-bolts, and filled with broken stone. The mouth-piece of the inlet-pipe is rectangular in shape, 5 by 12 feet, closely grated by vertical iron bars ½ by 3 inches in size; spaces between the bars ½ inch, affording a clear water passage of 24 square feet sectional area; it is set back 2 feet from the face of the caisson, 5 feet above the bed of the river, and 1 foot below low-water line, thus being perfectly protected against drift and ice, and receiving the water in the most favorable manner. From the caisson to the engine-house, the pipe is laid in a bed of coarse gravel and sand. Thirty feet from the house, by means of a Y pipe, the inlet is formed into two branches, each 50 inches in diameter, which, at 16 feet divergence, run parallel through two arches into the two pump wells in the house, and terminate in rectangular chambers, partly open on top, (made of boiler iron, scant ½ inch thick) 3 feet deep, 6 feet wide, and 22 feet long. With these chambers, the suction-pipes of the main pumps are connected, at a distance of 299 feet from the mouth of the inlet pipe.

With the ends of the chambers, in which the branches of the inlet terminate, are connected pipes twenty inches in diameter, communicating with the pump mains leading from the pumps to the stand-pipe; these pipes are provided with stop-gates which can be opened at pleasure and the water turned back to the river through the inlet-pipe, with a velocity due to the stand-pipe head, thus cleaning the strainers, scouring the inlet, and removing the deposit of mud and fine sand, which, at this point in the Ohio, during high stages of the river, is a source of great annoyance and very prejudicial to the perfect action of pump-valves. The functions of this branch of the works, during fourteen months' trial, have proved eminently satisfactory, although not manifesting themselves exactly in the manner anticipated. The chambers in which the branches of the inlet-pipe terminate and with which the pump-suctions are connected, were constructed air-tight, but provided, each, with a rectangular aperture on top 2½ by 6 feet, covered by wrought-iron plates, fastened with screw-bolts, and so arranged as to be removable at pleasure.

Immediately under these plates, in each chamber, were introduced additional strainers, for the purpose of arresting any floating substance that might find its way through the strainer at the mouth of the inlet, and prevent its interfering with the action of the pump-valves.

During the latter part of December, 1860, and the fore part of January, 1861, the stage of the river being near low water, in starting the engines, the pumps occasionally did not take water as readily as was desirable, being obliged to make from fifteen to twenty strokes, before water was obtained.

Believing the inside strainers to be partly obstructed, the plates covering the apertures in the above described chambers were removed, and the strainers (eight feet distant from the pumps) found unobstructed. On further examination, it was found that the difficulty was properly attributable to a different cause, and had partly corrected itself. At a distance of twelve feet from the pumps, partly over the inside strainers, both chambers (being weakest at these points) had given way on top, evidently having been forced in by atmospheric pressure due to partial vacuums formed in the chambers by the action of the pumps; the inertia of the water in a supply pipe 299 feet long, being too great to be overcome as rapidly as pumps worked by Cornish engines are required to take the water, particularly when the pressure of steam is great and cut off at a small fraction of the stroke.

Believing that the inside strainers, notwithstanding they being unobstructed, offered still a resistance to the passage of water that was prejudicial to the perfect action of the pumps, they were removed, and the pumps now take their supply from open wells as it were, and act with perfect ease.

The reason for originally constructing these chambers air-tight, was to have the full pressure of the stand-pipe head for the purpose of scouring the inlet-pipe; this, however, experience has demonstrated to be not absolutely necessary, since, during the past season, the inlet has been frequently and effectually scoured, with the chambers open on top; the scouring acting in every way satisfactorily and as originally intended, with the exception, perhaps, of requiring a greater quantity of water than if the chambers were air-tight.

Cost of inlet-pipe and river-work complete $26,649 26.

Engine-House and Chimneys.—The structure for the accommodation of the engines and boilers, consists of a main building and two wings, embracing a pump-room, engine-rooms, two boiler-rooms, two store-rooms, blacksmith shop, and office for the engineer in charge of the engines. The pump-room is 22 by 39 feet, and 39 feet deep from the main floor in the engine-room to the top of the walls, in which are built and anchored the cast-iron beams supporting the main pumps. These walls, three in number, and running parallel with the branches of the inlet-pipe, are 7 feet 8 inches deep, 22 feet long, the middle one 8 feet and the outside ones 7½ feet wide; all three bonded in the walls of the foundation; they form the pump wells, which are 8 feet 2 inches deep, 8 feet wide, and 22 feet long. The foundation of the pump-room is 36 by 53 feet in plan on the outside, and extends 6 feet into coarse gravel and sand and 3 feet below *extreme low water* surface in the river. At an elevation of 25 feet from its base, the foundation is extended 26 feet in depth, forming the foundations of the cylinder-wall and cylinder-end of the engine-house, which are commenced upon a gravel fill (made in the excavation for the pump-room foundation), by laying down, at intervals of 10 inches, oak timbers 10 by 16 inches and 27 feet long, lapping on the beam wall 1 foot, the spaces between the timbers being filled with concrete. At this same elevation, on each side of the main building, the foundations, 34 by 56 feet in plan each on the outside, for the wings or boiler-houses, are commenced, partly on a gravel fill and partly on the natural river bank, 6 feet below its surface.

The foundations for the boiler-houses have, on both their principal and river fronts, rectangular projections for supporting store rooms, blacksmith shop, and office. On the principal front they are 13 by 24, and on the river front 8½ by 24 feet in plan respectively. From this point the foundations are carried up together to an elevation of 43 feet above *extreme low-water* surface in the Ohio; making the walls forming the foundation of the pump-end of the house 46 feet high, and those of the cylinder-end and wings of the house 21 feet. The walls forming the pump-room are 6 feet in thickness at the base and 4½ feet on top, excepting the beam-wall, which is 6 feet in thickness throughout. Those of the cylinder-end of the house and wings vary in thickness from 2 to 3 feet. The wall on which the steam-cylinders rest, is 10 by 33 feet and 21 feet high, and is united with the foundation of the house and beam-wall, by judiciously introducing inverted and crowned arches, so as to equalize and uniformly distribute the weight. At an elevation of 23½ feet from its base, the beam-wall is perforated by two elliptical arches 6 by 9 feet in the clear, and located exactly in the center lines of the engines; these arch-ways, *of brick from the beam-wall*, are built partly in and partly under the foundations, in continuous lines, and extend from the beam-wall to the foundation of the stand-pipe tower, for the purpose of conducting the pump mains to the stand-pipe, which is situated 123 feet from the pumps.

The foundations for the chimneys are commenced on the natural river bank, 19 feet above *low-water* surface, by laying down, on a bed of concrete one foot thick, two courses of oak timbers 10 by 12 inches and 20 feet long; the timbers of the two courses cross one another at right angles, and are placed at intervals of 10 inches, the intervening spaces being filled with concrete. Upon this base the first courses (18 feet square) of the masonry are laid, reducing the walls in three courses to 16 feet square, from which point they are carried up vertically to the same elevation as the engine-house foundation, and are solid bodies of masonry. In the upper three courses the walls are reduced to octagons 13 feet 4 inches inside diameter.

The *stone-work* is of the character known as hammer dressed, with a rock face finish, and is capped with a neatly bush-hammered water table 14 inches in thickness. The stone is an excellent and durable gray limestone, of a very cheerful color, and was quarried on the land belonging to the Louisville Water Company.

The superstructure is of brick, the main building 47 by 56½ feet in plan, is two stories high, the lower one 26 and the upper one 24 feet, and has a portico in front of it 15 by 49 feet in plan, with four Corinthian columns, 42 feet high, supporting an entablature and pediment. The wings or boiler-houses, 32 by 56 feet in plan each, and the front and rear projections 13 by 21 feet and 9 by 21 feet in plan respectively, are 19 feet high and form but one story. The roofs are of slate laid on floor sheeting supported by wrought-iron trusses resting on top of the walls, and securely anchored in the brick-work. The cornices are of wood, and the gutters, eaves, and ridges are covered with sheet copper. The inside of the main building is tastily finished to correspond with the machinery; having a paneled wood ceiling, wood cornice, wainscoting, window and door pilasters and caps in the lower story, and paneled plaster ceiling with centre-piece, wood cornice, and window pilasters and caps in the upper story; both stories are plastered. The outside of the building is ornamented with cast-iron window-sills, pilasters, and caps, and at all the corners of the main building and wings brick pilasters, with cast-iron bases, are put up and surmounted by Corinthian capitals in terra cotta.

The structure, of the Corinthian order of architecture, has an individual beauty that is rarely met with, being delicately harmonious in its proportions, and at the same time grand and imposing in effect.

The chimneys are of brick, each consisting of a base and main shaft; the base being octagonal, 12 feet inside diameter and 17 feet high, having a projecting cornice and paneled faces; the main shaft is circular, 114 in height, 11 feet diameter at its base, and 7 feet on top, making an entire height of chimney of 121 feet, with a circular internal flue 4 feet in diameter.

Cost of engine-house and chimneys, $102,590 38.

Coal-Houses.—Sixty-seven feet distant from the ends of the boiler-houses are erected the coal-houses, 23 by 41 feet in plan each. The foundations are of stone and the superstructures of brick, covered with slate roofs. Each house has capacity to store 10,000 bushels of coal.

Cost of the coal-houses, $5,684 01.

Stand-Pipe and Tower.—Immediately in front of the engine-house and 64 feet distant therefrom, is erected the stand-pipe and tower. The object of the tower is to give lateral stability to the stand-pipe and protect it against frost; its foundation was prepared in the following novel manner, which has proved itself wholly satisfactory and economical: Through the loam deposit, forming the river bank at this point, an octagonal pit or shaft 26 feet in diameter, with vertical sides sustained by timber curbing, was excavated 28 feet deep to the gravel stratum underlying this deposit; this pit was refilled a depth of 16 feet with coarse gravel and sand, upon which the masonry, octagonal in plan and 24 feet inside diameter, was commenced and carried up solid 4 feet high, reducing it to 21 feet 4 inches diameter, thus forming the base for both the stand-pipe and tower.

From this base, the foundation walls, 3 feet thick, octagonal in plan on the outside and circular inside, forming a chamber 14 feet in diameter with three arched openings for the accommodation of the pump mains, are carried up 22½ feet, to the same elevation as the engine-house foundation, being capped with an 8-inch water table, upon which the superstructure is commenced.

The superstructure consists of a base, main shaft, lantern or look-out, and dome. The base, of brick, is, on the outside, an irregular polygon (?) of eight sides,

four of which are rectangular piers, projecting one foot, forming, with the remaining four sides, which are arcs of a circle of 10 feet radius, salient and re-entering angles; these piers give relief to the base and are themselves relieved, the easterly and westerly ones by windows, the northerly one by a door entrance to the inside of the tower, and the southerly one by a niche containing a fine marble slab with inscription. The piers terminate with cornices at an elevation of 20 feet, where the base becomes circular, is carried up 17 feet 9 inches higher, and is capped by the base moulding (cast-iron) of the main shaft.

The base is surrounded by a circular portico 38 feet 4 inches in diameter, resting on a stone foundation 13 feet deep. The portico, completely surrounded by stone steps, consists of ten Corinthian columns 22½ feet in height, supporting an entablature 6 feet in height, which is surmounted by a balustrade with pedestals over each column bearing figures or statues representing Ceres, Flora, Diana, and the Horæ in part.

The main shaft is constructed of wood, consisting of ten radiating vertical frames, each formed of two timbers, 4 by 8 and 4 by 6 inches respectively, standing on ten sills 14 by 16 inches each, which rest on the columns of the portico and extend through the brick-work to the inside of the tower, where the timbers of each frame, united by bolts, form a common tenon, resting in a cast-iron shoe or mortis-plate secured to the end of each sill. The sills are anchored to the foundation by four 2 inch wrought-iron bolts, extending 12 feet into the stone-work; and to the sills the radiating vertical frames of the shaft are anchored, standing inside of the brick-work.

The timbers of each frame, from their junction in the cast-iron mortis-plate, diverge to a distance of 3 feet 2 inches, at an elevation of 13 feet 9 inches from the sills, being on a level with the top of the brick-work, and capped with an oak timber 4 by 8 inches, reaching on the wall 10 inches. Each frame is here again anchored to both the sill and brick-work, by a ¾-inch bolt extending from the bottom of each sill, vertically, through the brick-work into the oak timber which forms a cap to the lower portion and a sill to the upper portion of the frame, the upper and lower portions being here strongly united by wrought-iron straps and bolts. From this point up, the inside timber of each frame is vertical and the outside one battens, meets, and is secured to its mate at the top. The frames are held vertically in position by segmental horizontal rails and secured by lattice stays and braces. The shaft is circular, 16 feet outside diameter at the base and 12 feet at the top; it is 84 feet in height and capped with an ornamental square 16 by 16 feet and 4 feet high, forming the base for the lantern. The shaft is hollow, and covered both on the out and inside with vertical staves 1¼ inches in thickness, matched, tongued, and grooved, forming on the inside a cylindrical and on the outside a conical tube, to give lateral stability to the framework; the outside of the shaft is relieved by ten panels, formed with bold mouldings and fillets, and extending from the base to the cap.

On the cap, as a base, is erected the lantern or look-out, constructed similarly to the shaft and fastened to it, being in fact a continuation of the shaft. The lantern is a circular room, the floor of which is 4 inches below the top of the stand-pipe, 132½ feet above the surface of the ground, and 173 feet above low-water surface in the river; the room is 9 feet 2 inches inside diameter and 27 feet high, having ten windows, one directly over each panel of the shaft. The lantern is surmounted by a spherical dome of 6 feet radius. The entire height of the tower, from the surface of the ground to the top of the gilded ball on the dome, is 197 feet.

The stand-pipe, 123 feet distant from the pumps, resting on a cast-iron base, with three 40-inch branches to connect with the pump mains, is made of boiler iron, ½ inch thick at the base and ¼ at the top; it is 48 inches inside diameter, open at the top, and answers the purpose of an air-vessel for each pump. The pipe is enclosed by the tower, leaving an annular space between it and the inside of the tower, which is occupied by spiral stairs, bracing the pipe and affording access to the lookout, from which the visitor has a bird's-eye view of the "beautiful Ohio," bearing upon its bosom the commerce of the West, also of the Falls and adjacent cities, and a vast extent of country, presenting varied lanscapes of great beauty.

Improvement around Buildings.—An earth fill (on the natural bank of the river) 12 feet deep, 165 by 400 feet plan on the top, and brought to an elevation of 40½ feet above low-water surface in the river, surrounds the engine-house, coal-houses, and stand-pipe tower, and is divided into a yard, and front and end roads.

The yard, access to which is obtained through the stand-pipe portico, is, with the buildings, inclosed by an iron fence, turfed, laid off in gravel walks, and ornamented with evergreens. The roads in front and on the ends of the yard, 40 and 22 feet wide, respectively, with side-walks 8 feet wide, are paved, macadamized, and graveled.

This embankment has three approaches, one in front by the road from the reservoir, and one on each end, the easterly one extending down to *low water*, for the purpose of bringing up coal. The river shore at the engine-house has been filled with earth so as to make the bank slope gradually to low water; this slope is covered with broken stone to a depth of one foot, securely protecting it against the action of the current in the river, which, at this point, during freshets, is very rapid, and destructive to the unprotected banks. This work is not quite completed, but was left in a safe condition in the fall, and will be completed during the coming season.

Cost of improvement around buildings, $21,093 21.

The engine-house, coal-houses, and stand-pipe tower are all completed (excepting painting in part), well adapted to the purposes for which they are intended, and fully equipped with all needful appurtenances, including a blacksmith's forge and tools, and 500 feet india-rubber hose, which, at a moment's warning, in the event of accident by fire, can be attached to a fire-plug in the engine-house, or to the stand-pipe, and the water successfully used for thwarting this destructive agent.

These structures are so symmetrical in their individual proportions as well as their relative locations, as to present to the observer—from whichever standpoint, the river, the road, the reservoir hill, or from within close proximity, he may view them—a beautiful architectural picture which lacks nothing to complete it.

Pumping Engines.—The motive power for elevating the water, is steam, rendered available by means of two Cornish engines, exactly alike, working each a single acting lift and force plunger pump. The dimensions of the principal parts of the engines and pumps, are as follows, viz: Steam cylinders 70 inches diameter, stroke of steam piston 10 feet. The beam for each engine is double; the two members, 3 feet 5 inches apart from centre to centre, are each 31 feet 10 inches long between end centres, 6 feet 9 inches deep in the middle, with 3 inch thickness of web and 9 inches width of center rib and outside flanches; the cylinder and pump ends of the beam are equal in length, each pair of beams weighing 42 tons. The beam vibrates on a main centre or shaft 20 inches diameter, 9 feet 8 inches long, with journals 15 inches diameter, and 19½ inches bearing. The plummer-blocks, for the beam centres of both engines, rest in pedestals, bolted to a massive cast-iron entablature, which (extending transversely across the house and into the brick walls) is supported by four Tuscan columns, of cast-iron, standing on and anchored to the beam wall, by means of arched cast-iron bed-plates, built in the masonry. The piston-rods are guided by parallel motions, and the pump connecting-rods by cross-heads and slides; piston-rods 6¼ inches diameter and 16 feet long, each; pump connecting-rods 8 inches diameter and 28 feet long, each.

The pump barrels are 36 inches in diameter each, plungers 36 inches diameter, with stroke same as steam piston, 10 feet. The extreme lift of the pumps, when the river is at its lowest stage, is 21 feet 10 inches. The pumps are connected with the stand-pipe, by two lines of 40-inch flanched pipes provided each with a stop-gate near the stand-pipe. The pump-valves are of the kind known as Harvey and West's double-beat valve. The pumps and pump-mains to the stand-pipe, have a circular water-way of 40 inches diameter throughout, thus admitting the introduction of pump barrels 40 inches in diameter, and increasing the present pump capacity 23 per cent. whenever the consumption of water will demand a greater supply than at present provided for.

The metal (cast-iron) of the pumps and pump-mains, is from 2 to 3 inches in thickness, varying as the forms vary from the cylindrical to the oval or rectangular. All the joints are made with lead by means of flanches and bolts; the flanches are from 2½ to 3 inches thick, and from 4 to 6 inches wide, with 1¼-inch bolts.

Boilers.—Each engine is provided with a battery of three single-flue Cornish boilers, each of the following dimensions, viz.: length of boiler 30 feet and 6 feet in diameter; length of flue 30 feet and 46 inches in diameter; grate bars 6 feet long; grate surface 22½ square feet for each boiler, and heating surface of each boiler 676 square feet. Each battery of boilers is provided with one of Brooks' patent heaters, and the steam-pipes are connected so that either engine can be worked by either battery of boilers.

Each engine, when working with its maximum velocity, ten strokes per minute, has power and capacity to elevate 3,780,000 gallons (U. S. standard) of water into the reservoir in 12 hours; or both engines working together, (the stand-pipe is high enough) with their maximum velocities, will elevate 15,120,000 gallons of water into the reservoir in 24 hours.

The Cornish engine adapts itself so accommodatingly to the amount of work required, that it can be run with a velocity varying from 1 to 10, and in some instances, 15 strokes per minute, without suffering any inconvenience or laboring at a disadvantage, so far as the engine is concerned.

The performance of the engines for the Louisville Water-Works, has, during the past year, been very satisfactory. The highest daily duty (calculated by the Cornish method) was 48,363,344 pounds of water raised 1 foot high per 100 pounds of coal; the highest monthly average was 35,957,629 pounds, and the yearly average duty 30,217,865 pounds. This is not a high duty for the Cornish engine, but low as it is, it is still creditable to the engines, when it is known, and due allowance made for the facts, that the steam-pipes and drums are not felted; the cylinders not being cased in, until during the latter six months of the year; and that more than one-third of the entire quantity of fuel consumed during the entire year, was burned for raising steam preparatory to starting the engines; the number of days the engines were worked being very great in proportion to the length of the time worked in each day.

Cost of engines and connections complete, $117,753 64.

Pump Main.—From the stand-pipe (into which the water is elevated by the pumping engines), through a 30-inch main, by the force of gravity, the water is conveyed into the reservoir. The main is 3,650 feet in length, provided with one check-valve, located 400 feet from the stand-pipe, has two horizontal curves, one 448 feet radius and the other 150 feet radius, and three vertical curves, two of 100 feet radius and one of 12 feet radius. The main is not in direct communication with the water in the reservoir, but rises perpendicularly from the middle embankment and discharges its water over a bell-mouthed adjutage at an elevation of 144 feet above *low-water* surface in the river; the main has a 4-inch branch connecting with it on the outside of the embankment, provided with a stop-gate and extending to the inside of the reservoir; by this branch, through the 30-inch main, the stand-pipe and engine-house can be brought in communication with the water in the reservoir.

Reservoir.—The space now occupied by the reservoir was primeval forest before the commencement of the Works, being the nearest available ground to the engine-house, with the requisite elevation above the general topography of the city, for a reservoir.* The site was cleared of trees, stumps, roots, muck, and soil; of the latter two a sufficient depth was removed to reach the firm unchangeable clay, covering from 4 to 10 feet in depth, the limestone bed underlying the reservoir. This left the topography of the site very

* The minimum head, above the topography of the city, when the reservoir is full, is 81⅓ feet; or in other words, the surface of the water in the reservoir, when full, is 81⅓ feet above the highest street-grade in Louisville.

irregular, varying originally, by undulations, depressions, and cavities, from 5 to 30 feet in elevation, the highest point being 122 feet above *low-water* surface in the river.

To this elevation (122 feet above *low-water* surface), the base of the retaining embankments was raised, by filling two of the cavities, which extended into the rock, with masonry grouted with hydraulic cement, and the remaining inequalities with clayey earth, free from all vegetable matter; the earth was well saturated with water while the fill was being made.

Upon the plateau thus formed, the retaining and division embankments of the reservoir were commenced, with clayey earth free from all perishable substances, and carried up, by putting the earth upon the embankments, in uniform layers of 12 inches in depth, well saturating with water each layer after being placed on the embankments and subjecting it to uniform cartage, so as to make the embankments impervious to water and of uniform density. The retaining embankments, 304 by 500 feet in plan on the outside, are 24 feet high, 92 feet wide at the base and 20 feet on top, with in and outside slopes of 1½ horizontal to 1 vertical. The division embankment, transversely across the main basin, is 12 feet high, 48 feet wide at the base, and 12 feet on top, forming the lower half of the basin into two equal compartments. The bottom of the basin is paved with two courses of brick flatwise, laid in hydraulic cement; the inside slopes of the retaining embankments and the slopes of the division embankment are paved with one course of brick edgewise, laid in hydraulic cement. To guard against sliding of the slopes from saturation with water, and to afford a footing for the slope paving, inverted arches, 9 inches thick, 13 feet radius and built of brick, are introduced at the bottoms of all the inside slopes and carried up 6 feet. The outside slopes are turfed; and on top the embankments have a graveled terrace 8 feet wide, for a promenade, with an iron fence on the inside, enclosing the basin, and a wood railing on the outside, near the slopes; access to the terrace is afforded by a flight of stairs in front of the reservoir.

Each compartment of the basin is provided with two 20-inch effluent pipes, one to connect with the main leading to the city and the other to drain its compartment, in the event of repairs or cleaning being necessary. Both compartments are thus connected with the main leading to the city, so that a supply can be furnished from either one. Each effluent pipe is provided, outside of the embankments, with a 20-inch stop-gate. The basin is also provided with a 20-inch overflow pipe to waste the water in the event of pumping longer than is required to fill the reservoir to high-water line, which is at 19 4-10 feet depth of water, and when filled to this line, the reservoir contains 7,100,000 gallons of water, U. S. standard.

The reservoir has a margin around its base, 60 feet wide in front and 44 feet on the sides and rear, turfed, enclosed by an iron fence, and ornamented with evergreens.

Cost for the reservoir complete, $74,535 37.

Pipe System.—The water is conducted into the city by one 20-inch main, extending from the reservoir down the Reservoir Avenue, Beargrass, East Main, and Main streets, as far as Preston street, at which point a 16-inch main branches off from it and extends south on Preston street as far as Chesnut street. With these mains the distributing pipes, 10, 8, 6, and 4 inches in diameter, are connected, from which consumers are supplied with water. The total length of pipe laid is 25 96-100 miles.

One hundred of the street-cisterns for the Fire Department are connected with the water-pipes. No fire-plugs are in use; their efficacy for supplying steam fire-engines with water has heretofore been regarded as doubtful. In some of the eastern cities they are, however, used in addition to street-cisterns, and regarded as equally efficacious, *and much more economical in construction and the use of water*, from the fact that cisterns, as generally constructed, are frequently leaky, and particularly so in streets where there is much heavy traffic, subjecting the cisterns to violent jarring and consequent leaks. It is believed that fire plugs, properly constructed, can be introduced with advantage to the steam fire-engines and great economy in the use of water, especially along the 6, 8, and 10-in. lines of pipe.

Grounds.—The grounds belonging to the Louisville Water Company are reached either by the river turnpike or by the Reservoir Avenue, a private road opened from the head of Beargrass street, along the base of the hills, to the reservoir. This avenue will in time become a delightful drive, as the naturally beautiful building sites which adorn it, are destined, ere long, to be graced with private residences. The land is in two tracts, touching at a point only, where their boundary lines intersect, nearly at right angles. The engine-house tract containing 28½ acres, and the reservoir tract 30¾ acres.

The engine-house tract consists wholly of low or river bottom land, its topography gently undulating, varying in elevation from 18 to 30 feet above low-water surface in the river. Of the reservoir tract, one-half is similar to that of the engine-house tract, its elevation varying from 20 to 36 feet above low-water surface, and the other half, on which the reservoir is built, is elevated table land, partly covered with forest trees, and situated on a bold and elevated bluff, with a rugged limestone front, from 80 to 100 feet in hight and 1,600 feet in length.

Its topography is strongly marked, varying in elevation from 30 to 125 feet above low-water surface in the river. This latter tract is picturesquely situated and naturally beautiful, and by the aid of good taste and art, it, in connection with the low land, is susceptible of being beautified and embelished, as a park, to an extent that will rival, if not surpass, anything in American landscape gardening. Last spring the work of improving the grounds was commenced, by planting trees, sowing the land in grass, laying out and partly grading some of the principal drives, partly excavating two localities for lakes, building a fountain, etc., etc., but for financial reasons this work was prosecuted only during part of the season, and was left in a safe condition, but far from completion.

The grounds, comparatively unimproved, are already visited during the summer months, by great numbers of our population as well as strangers, who all express the greatest admiration for their rural beauty and adaptation to the purposes for which they have been selected.

When improved to an extent which their natural fitness merits and the wants of the citizens demand, and by means of street railroads brought home to the door of each family, as it were, and is hoped they will be at a future day not far distant, the grounds will furnish our citizens with a delightful place of public resort, where the man of business can find recreation from toil and oblivion of care; women and children obtain unrestricted exercise and amusement in the open air, and the infirm consult heaven's pure atmosphere and the genial sunlight as their medical advisers.

The Water Company also owns a lot on Third street, east side, between Walnut and Green streets, upon which is erected a neat and commodious two-story building, for an office in which to transact the Company's business. The office was built by J. H. Davis, contractor, being designed and its erection superintended by Mr. Gideon Shryock, architect.

During the past year, the work on the stand-pipe tower and engine and coal-houses, has been completed; the iron fences put up; river shore improvement made; roads around buildings paved, macadamized, and graveled; engine-house yard, slopes of road embankments, and reservoir hill-side, protected by turfing them; the road up the reservoir hill graded, paved, macadamized and graveled; culverts built; Beargrass bridges put up; two miles of pipe laid, and a number of street cisterns connected.

Some branches of the Works are still incomplete, viz., painting the wood-work inside of the house and stand-pipe tower, portico columns and pump-work; flagging porticos; putting up iron-railing around the cylinders and hand-gear of the engines; making approaches to Beargrass bridge; felting steam-drums and pipes, and ceiling and plastering the boiler-houses with two coats rough plaster.

All this, however, can be delayed without sustaining any injury or causing serious inconvenience, with the exception of felting the steam-pipes and plastering the boiler-houses, which is very much needed, for the reason that the want of it causes great waste of heat by radiation and consequent unnecessary consumption of fuel.

The Works, as a public improvement, are second to none in the country, where steam is the motive power for elevating water; and no city in the United States, of the same population and wealth as Louisville, has, in its first attempt to introduce water, provided itself with Works, whose maximum capacity for supply, furnishes so large a quantity of water per day for each inhabitant.

The principle of *order and beauty*, ever inseparable from utility, pervades the Works from beginning to end, reflecting great credit on both city and State; and particularly gratifying must it be to the stockholders and citizens to know that the Works have been constructed wholly by the skill and industry of Louisville artizens and mechanics, to whom the public is greatly indebted for the faithful performance of the work. And it is also *just and proper* to remark here, that to two persons, Alfred Harris, Esq., President, and T. R. Scowden, Esq., Chief Engineer of the Works, the city of Louisville is particularly indebted.

To the engineer, for the taste, skill, and capacity displayed in the selection of the efficient and beautiful site, designing the engines, buildings, and all that pertains to the Works, and furnishing the requisite information to all engaged, for the successful construction of their respective branches; and to the President, for the efficient manner in which he has conducted the finances of the Company, his constant watchfulness over each and every department, and for successfully carrying out the first enterprise of magnitude by the city of Louisville, which has been completed without a single suspension.

The contractors, by whom the respective branches of the Works were constructed, were:

For water pipes and attachments	Messrs. Hutchings & Co.
" do do	Mr. George Meadows, and
" do do	Messrs. Inman, Gault & Co.
" Pumping-engines and stop-gates	Messrs. Roach & Long.
" Cornish boilers	Mr. Joseph Mitchell.
" Stone-work and reservoir	Mr. W. P. Hahn.
" Brick-work	Mr. Ed. Crutchfield.
" Carpenter's work	Messrs. White & Cole.
" Architectural cast-iron work	Mr. George Meadows.
" Terra-cotta work and plastering	Mr. P. Bannon.

By the past year's experience, the success, reliability, and economical working of the Water-Works have been fully established. The supply, during the year, has been uninterrupted, with the exception of two instances in which the water was shut off from the city for the purpose of repairing a break and a leak in the mains. In the first case, January 7th, 1861, the water was shut off during five hours, from 7½ o'clock A. M., and in the second case, February 7th, it was shut off during one hour and a half from 2 o'clock P. M. Such interruptions are scarcely worth while mentioning, from the fact, that where there are but single lines of pipes, the slightest leaks (to which any line of pipes, particularly newly laid ones, as these were, are subject) involve the necessity for shutting off the water for a short time, in order to effect the necessary repairs.

The average daily distribution of water, during the year, has been, for each inhabitant, 9 2-10 gallons; for each consumer 73 6-10 gallons; total average daily distribution 640,627 gallons, and total distribution for the year 233,829,045 gallons.

This is a small consumption of water, for our population, and a trifling task for the capacity of the Works, whose economy is much reduced by so limited a patronage, as can be seen from the following calculations:

Cost of maintaining the Works for 1861.

Interest on 956 City Bonds, $1,000 each, at 6 per cent	$56,360 00
Cost of conducting the Works—running and current expenses	11,338 01
Total cost of maintaining Works	$67,698 01
Revenue for the year ending Dec. 31, 1861.	12,445 60
Excess of cost for maintaining Works over revenue	$55,252 41

The total distribution of water for the year has been 233,829,045 gallons, at a cost of $67,698 01, including interest on bonds, and cost of conducting Works; or

Interest payable on bonds per 1,000 gallons of water delivered..... $24\frac{103}{10000}$c.
Expense of conducting Works per 1,000 galls. of water delivered.... $4\frac{3483}{10000}$c.

Total cost per 1,000 gallons of water delivered..... $28\frac{9513}{10000}$c. multiplied by 233,829,045 galls. equals $67,698 01
And revenue per 1,000 gallons of water distributed. $5\frac{3227}{10000}$c. multiplied by 233,829,045 galls. equals 12,445 60

Excess of cost for maintaining Works, over revenue, as before..... $55,252 41

This is an enormous cost per 1,000 gallons of water delivered, an unusually small amount of revenue derived for each 1,000 gallons distributed, and is not owing to any inherent defect in the Works, but wholly arises from the too limited patronage this public improvement has so far received; evidently withheld by reason of the almost total prostration of all commercial and industrial pursuits which are productive of prosperity; for it is not a characteristic of the citizens of Louisville to allow such a potent agent for conducing to health, cleanliness, luxury, and comfort, as Water Works are everywhere admitted to be, to remain unappreciated and without patronage.

The Works, *with the current expenses the same as at present, excepting fuel,* can deliver and distribute, with perfect ease, 4,000,000 gallons of water daily, which, if paid for at the rate of 9 58-100 cents per 1,000 gallons (the *actual amount* received for each 1,000 gallons distributed in Cincinnati, Ohio, although making the assessments at the rate of 12 cents per 1,000 gallons) would bring a revenue of $139,868 per annum, an amount more than sufficient to pay the interest on the bonds and all current expenses; and at the same time furnishing only 55 gallons of water to each inhabitant per day, while at present, estimating fifteen persons as using the water for each permit granted, the consumption for the past year has been, on an average, 73 6-10 gallons for each person per day.

The probable amount of revenue for 1862, is difficult to estimate. Taking, however, the gradual increase during the past year, as a basis for calculation, the amount will not fall short of $15,000; and it is reasonable, from present indications, to expect at least a partial restoration of business and trade, which can scarcely fail to increase the number of consumers sufficiently, to insure an amount of $20,000 revenue for the present year.

A careful and accurate survey of the lines of water-pipes and locations of stop-gates and cistern connections has been made during the past year, and their relative locations transferred to a map, made partly from the assessment maps of the city and partly from actual surveys. The map is not quite finished, but will be as soon as the more urgent duties of the office will admit of it. It is also contemplated to enlarge the scale of the map, make it in book form, in which to record the pipe-system, showing the locations of the lines of pipes, stop-gates, cistern-connections, etc., accompanied by the measurements in figures, for safe-keeping and such future reference as may be desirable.

The employees of the Water Company, under the supervision of the Superintendent, have, without a single exception, been industrious, faithful, and constantly attentive to their respective duties, and are justly entitled to your confidence and good-will.*

The accompanying Schedules, to which you are referred through this Report, explain themselves by inspection, and give, in synoptical form, such information and particulars as are pertinent to a full report and more concisely stated in synopsis than if otherwise rendered.

Respectfully, CHAS. HERMANY.

ENGINEER'S OFFICE L. W. CO., *March 24th*, 1862.

[We are compelled, from want of space, to omit the schedules.—ED.]

PETROLEUM ITEMS.

REFINERIES.—Crude petroleum is exported in large quantities from the oil regions to various places, where it is refined and rendered fit for common use. A large number of refineries are situated in the vicinity of New York, and other places far distant from the sources of supply. It is evident that all the refuse of the refinery, is just so much extra expense involved in carrying the crude article, and it is reasonable to conclude, that if it were refined in the vicinity of the oil wells, where coal is abundant and cheap, a great saving would be effected. On the other hand, we must take into consideration the cost of transporting from the seaboard, those chemicals used in refining. These chemicals principally consist of sulphuric acid and caustic soda. The acid is manufactured in various chemical establishments, and in the vicinity of New York, in large quantities at Bushwick, L. I., and in the extensive chemical works of Messrs. Powers & Weightman, Philadelphia. A number of refineries have been erected in several of the villages in the oil regions. In distilling petroleum, a very light oil passes over at first, when the heat is low. This is the liquid commonly called benzine, and is the volatile dangerous fluid that has been the cause of so many explosions. It is a powerful solvent, and will dissolve resins and grease. The temperature of the still is subsequently raised, and the whole of the petroleum is distilled, leaving a residue of bitumen. The distilled product is afterward agitated in a vessel with warm dilute sulphuric acid, is allowed to settle, then run off into another vessel, where it is washed with water. It is then agitated with caustic soda in solution, washed with water, and submitted to a second careful distillation, which finishes the operations. If these are carefully conducted, the oil obtained will be nearly as colorless as alcohol. Some specimens of petroleum are rendered very pure by one careful distillation. Various opinions exist among refiners respecting the kind of stills which should be used. Oils of different specific gravities are obtained from petroleum, according to the temperatures to which it is subjected during distillation. That which passes over at a temperature of 302° Fah., according to the experiments of Professor B. Silliman, Jr., has a specific gravity of .733 (three lower than sulphuric ether); that which has been obtained at 320° has a specific gravity of .752; that at 338° Fah., .766; at 392°, .800; at 518°, .854. Pure alcohol has a specific gravity of .815. As several eupion oils obtained from petroleum are lighter than alcohol, we can thus form a very correct idea of their volatile character.—*Phila. Coal Oil Circular.*

PETROLEUM LAMPS WITHOUT CHIMNEYS.—A party in Portland, Me., have patented an invention by which they can burn well oil in lanterns without any chimney. They can apply the apparatus in any lantern. It is simple and effectual, and a good light is afforded at half the usual cost.

THE SALT WELLS OF OIL CREEK.—In boring for oil in this locality, veins of salt water are very frequently struck, some of them of excellent quality. Phillips, Frew & Co. struck a well some two weeks since, immediately on the bank of their wharf, in this place, which flowed some four or five barrels per day, at the time it was struck. It has since increased to 12 or 15 barrels. The water that flows with the oil from this well is the strongest salt water we have seen in this region. It crystalizes into salt as it flows from the vat, and could be doubtless made profitable. This is only one of many, and we look for the day when the Venango Region can supply the world with an excellent article of salt, as well as the article of light.—*Oil City Register.*

EXPLOSIVENESS OF COAL OIL.—A daily paper says: Experiments with petroleum oil, recently made at Liverpool, by direction of the municipal authorities and the fire insurance companies, failed to establish the explosive character of the Canada and Philadelphia varieties.

PORTABLE GAS APPARATUS.—A correspondent of the London *Builder* describes a portable gas apparatus for domestic use, which, he says, is simple, effective, and not expensive. It consists of furnace, vertical retort, washer, and gas-holder, and burns all kitchen refuse containing fatty or oily matter.

TOWN SEWAGE.

The select committee on the sewage of towns has just concluded its inquiries, and the report may soon be expected. The following is a summarized analysis of the evidence. As regards the value of town sewage, in reference to its ingredients, as compared with other manures, liquid and solid, the evidence proves that it contains the elements of every crop that is grown; it does not lose anything by evaporation; it comes into immediate action on the crop, and possesses an amount of heat which stimulates vegetation; and even its water is of great benefit for agricultural purposes. The Belgians consider the excretion of each person worth £1 per ton. The sewage permanently improves the land, and has been applied most economically by hose and jet, with great advantage to common grass, Italian rye grass roots, and grain crops. The grass so stimulated is grateful to cattle, improves their constitution, and increases the quantity and richness of the milk of cows, as the earth not only absorbs, but also deodorizes it, if it be not applied in too large quantities. Indeed, to be profitably used, it must be applied in slight dressings, and, so employed, it will supersede the use of guano and artificial manures. It may be applied at any time of the year, except during hard frosts, to every description of soil which is naturally or artificially drained; and the most profitable returns, as in the case of all other manures, will be obtained when it is applied to the best soil. There are in it matters of themselves injurious to vegetation, but they bear so small a proportion to the entire bulk as to be perfectly harmless. If applied as recommended—*i. e.*, in slight dressings—no nuisance would be created by its use; the earth, as has been said, deodorizing it; but it cannot with profit be manufactured into a solid manure.—*London Builder.*

[This is rather a different opinion from that expressed by Dr. Voelcker, which we published on page 77 of this volume.—ED. AM. GAS-LT. JOUR.]

GAS IN ENGLAND.—We recently announced that in consequence of the disaffection felt towards the York, England, Gas-Light Company, an opposition company is talked of. The York *Herald* referring to the controversy, says: "From the company's balance-sheet, laid before the half-yearly meeting of the proprietors, it appears that the actual amount realized by the sale of gas and coke, during the past six months, has been £10,878 14s. 6d., whilst the cost of coals and lime has only been £2,350 19s. 1d. The sum 'available for dividend and working capital' is put down down as £8,926 8s. 4d., which will not only pay a dividend of ten per cent. per annum, but leave a surplus of at least £5,000, which the directors will be sorely puzzled how to apply, since the company have no borrowed capital, and no present means of spending a few thousands, although they seem to have hitherto had a pleasant mode of getting rid of surplus cash by paying for extensions of their mains, new buildings, and, in fact, everything that they might require for the extension of their business, out of revenue instead of capital. Six years back the company owed a £16,000 mortgage debt, and they have since not only paid all this off, but increased their dividends from six to ten per cent., and given bonuses, besides paying all current expenses out of revenue!"

We learn from the London *Builder*, that the Chertsey New Gas Company's Works are rapidly progressing towards completion, notwithstanding repeated attempts of the old company to interfere, by their workmen, with the laying of the new company's pipes, by filling up the trenches opened for the purpose.

The Worcester Gas-Light Company have declared a dividend of 8 per cent.

The Sherborne Gas-Light Company have declared a dividend of 7½ per cent., and reduced the price of their gas to 6s. 3d. per thousand cubic feet, with a discount of 5d. for cash.

NEW USE FOR COAL-OIL.—An English firm have suggested the use of coal-oil to saturate yarn and ropes either alone or mixed with tar, instead of the present mode of using boiling tar alone. It is said the use of coal-oil diminishes the risk of fire, (doubtful,) and at the same time acts as a better preservative from decay.

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MONDAY, SEPTEMBER 15, 1862.

A recent number of the *Journal de L'Eclairage au Gaz* contains a suggestive article on the disparity in the number of gas-works between Great Britain and the United States, from which the inference is anything but complimentary to the energy and enterprise of the American people. The figures upon which this inference is drawn are not taken from the country at large, where the deficiency of of the South in gas-works might be supposed to account for a portion of the difference; but the most important and wealthy of the free States are selected from which to make the comparison, and even with this most favorable exhibit, the balance is largely against us.

The State of New York, with a territory of 47,000 square miles, and a population of 3,887,542, with a surface dotted over with thriving towns and busy cities, has but 71 gas-works. Pennsylvania, with a territory of 46,000 square miles, and a population of about 3,000,000, has but 48: Ohio, comprising 39,962 square miles, and a population of 2,339,599, has only 32: and Illinois, with a population of 1,711,753, occupying a territory of 55,405 square miles, has but 13. Compare this with Great Britain, and the difference will be seen. England, Scotland, and Wales, comprising together 86,708 square miles, and having, according to the latest census returns, a population of 20,793,552, exhibit a total number of 1,100 gas-works, nearly if not quite all of them in a flourishing condition. Compared with the State of New York alone, Great Britain has, according to our French contemporary, fifteen gas-works to our one. Considerable allowance is to be made for the difference in population between the State of New York and Great Britain, but even with this allowance the disparity is too great, and the balance is still largely in favor of our trans-Atlantic friends.

Why should this be the case? Is it possible that our people need to be apprised of the advantages of gas-light? We boast of a population intelligent and educated, with a love of acquiring information, and a taste for reading far more generally diffused than in any other country in the world. Our mechanics and artizans, who toil through the day, read at night; and in our smallest towns and villages public libraries abound, while, as far as newspapers are concerned, no other country in the world can claim the number published here. Of course the greatest part of the reading of the people is done by artificial light, after the working hours are over, and it would seem but reasonable to suppose that that source of illumination would be adopted which is at once the cheapest and best. This, however, does not appear to be the case. Tallow dips and kerosene lamps still maintain the ascendancy; and although the increase in the number of gas-works is perceptible, yet it is so slow as to call forth expressions of surprise from many sources.

We have expressed our opinions on this subject before, and have regretted the indifference which has been so often manifested. There are towns almost claiming the dignity of cities where gas is still unknown, and not only in the older States, but in the great Northwest, where new cities spring into being with marvellous rapidity, there are many places where gas-works could be profitably erected, and a remunerative and increasing business be relied upon. We believe there are engineers among us with sufficient enterprise and energy who only require a hint to act; and we are sure that with this energy directed into proper channels, the reward would be tempting and easily reaped. In a short time the complete returns of the census of 1860 will be published, when the various cities, towns, and villages of each State will be tabulated according to their respective populations. On comparing this with the list of gas-works published on pages 198 and 199 of volume 3, of this JOURNAL, a number of flourishing towns will be observed with populations large enough to justify the erection of works. We believe that the current year will witness the construction of many new establishments, and that the future progress of gas-light will be quite equal to the hopes of its most sanguine advocates. The improved appliances which have been introduced, and the new processes which have been invented—some of which promise to cheapen gas-light materially—have led to increased interest being felt in the subject; and despite the war with its depression in many branches of business, the probability is that the number of works to be built during the year will compare favorably with the results of any similar period.

By gradual additions we hope to lessen the difference between the number of gas-works in this country and Great Britain. A field, boundless in extent, is before us, while in most European countries the limit has been already reached, and very little increase can be depended upon. Our cities are growing to so large a size that in many of them opposition companies are talked of, while in some they already exist and thrive. Altogether, the future of the gas-light interest is bright and promising; and notwithstanding the predictions of those who can see no room for extension, we are constrained to believe that each succeeding year will witness accessions to the number of works already in operation, and that the superiority of gas-light over any other source of artificial illumination will be practically acknowledged in many localities where it is now unknown.

WATER METERS.

The propriety of assessing water-rates by the indications of meters, is gaining ground among the engineers of our prominent water-works. The conviction that this is the only equitable way of making charges for water, is steadily advancing, and although it has had to encounter an old and deep-seated prejudice, consumers are beginning to see the justice of the step, and to be convinced that the water-meter is the instrument to determine the amount of their bills, and that by its use they are protected from being charged with the excesses of their more wasteful neighbors. We scarcely pick up a report of a water-company but we see favorable allusions to water-meters, with suggestions that they may be adopted, particularly for large consumers.

The Board of Public Works of Chicago, Ill., have added their testimony to the value of the water-meter, in the following language: "It is our own experience, as of Boston, New York, and other cities, that meters afford the only just means of assessing parties using large quantities." This opinion has been expressed by many enigneers throughout the country, and, as others are making careful trials of meters, it is safe to say that their use will be largely extended, and that hereafter water charges will be apportioned among consumers not by guess-work, but by the actual amount used. We hope this equitable method of assessment will soon be inaugurated, and we are confident it will result to the mutual benefit of water-companies and their customers.

SUBWAYS FOR GAS AND WATER MAINS.

The inconvenience attending the repeated breaking up of the street for the purpose of introducing gas or wates pipes into houses, has been long felt by the residents of large cities. Where but one gas or water company exists the practice is bad enough, but where several mains are situated in one thoroughfare, and it is necessary to make connections with either, the trouble and inconvenience arising from the disordered condition of the street, is annoying in the extreme. Even when the work is done and the pavement replaced, the settling of the freshly filled earth causes depressions in the streets, which are dangerous to the wheels and axles of vehicles.

In London, where the evils attending the breaking up of the streets are more seriously felt than here, owing to the great number of mains traversing single avenues, subways have been built; and the favorable experience of the working of the small number now in use, has led to a decided partiality for them, and to a desire for more of similar construction. In some of the streets of that city, the gas and water mains lay side by side, almost in contact, and filling the entire street. Where so many opposition gas-light companies are carrying on a vigorous competition, it is no unusual matter for consumers, from some fancied wrong, to withdraw their patronage from one company and derive their supply from the mains of another. This leads to further alterations, and the consequence is, that trenches are being frequently dug, and the pavements of the streets left in the most unsightly and almost impassable condition. The evils arising from this state of affairs have long claimed the attention of those having the highways in charge, and subways, in one or two instances, have been resorted to as a relief. The Metropolitan Board of Works, of London, have recently held meetings at which the subject of constructing additional subterranean receptacles for water and gas mains was discussed, and the necessity for them seems to be acknowledged.

The opinion of the officers of gas companies is almost unanimous in favor of subways. To say nothing of the diminution of labor in attaching service pipes to mains, other benefits would accrue to them. Their mains would not be imbedded in an absorbent material, like the clay underlying London; but would merely rest upon the floor of an undergound apartment, where access might be had to them at any time, and such measures resorted to as to stop a portion of the enormous leakage which now ensues. This leakage, which is estimated as high as 23 per cent. of the whole quantity of gas made, escapes principally through defective joints, and entering the earth is there absorbed, and partially deodorized, or its smell so masked by other effluvia as to render the detection of the particular spot where the leakage occurs, extremely difficult, if not impossible. In a subway, on the contrary, the mains could be examined with the same precision as pipes and fittings in the houses of consumers, and thus the precise places where the loss occurs be observed, and the leak stopped.

Although in New York city there are as yet no opposition gas companies in actual operation, yet there are two already chartered, one of which has commenced the construction of works and is said to

be rapidly pushing its plans along. The bitter feeling exhibited against the two old gas-light companies will doubtless hasten the completion of the Metropolitan Company's works, and may also invite other competitors into the field. In such an event the number of mains laid in the streets would be increased, and the advantages of subways be rendered apparent. Already the bursting of the great Croton mains has caused much trouble and at times impeded the progress of passers-by owing to the street being upturned to discover the leak. Had a subway contained these mains, no bursting would have occurred, for it was brought about solely by the inequality of the trench in which it was laid and the pressure of the superincumbent earth. But had the rupture occurred in a subway, it would have been easily reached, without the necessity of employing an army of laborers and digging up whole squares at a time to find the break. The time may come when subways will be considered indispensable in all large cities. Meanwhile, the experience of their use in London will be regarded with interest, and we hope to lay before our readers any information in regard to them which may transpire.

THE PROPOSED TAX ON GAS CONSUMERS.

In our last issue we noted in a gentle way the fact that some of the gas-light companies had determined to avail themselves of the clause in the excise law empowering them to charge to consumers the tax upon their product, which, by every principle of right and justice, the companies themselves should pay.

It was our impression then that a sober second thought would lead those companies—the New York gas companies in particular—to review this decision, and submit to the very reasonable assessment upon their profits, but it is not so; there is no sign of any such intent, nor do we believe any exists in that quarter.

It is useless to mince words about this act of the gas companies; we mean those who have availed of this permission—and we refer particularly to the New York and the Manhattan, and the Brooklyn, N. Y.—that it is the coolest piece of imposition ever attempted by a corporation upon an intelligent people.

This accounts for the presence of officers of several gas companies in Washington last winter, dining and perhaps feeing members of Congress; bamboozling them with wine and money to commit a glaring wrong upon the people.

Here are twenty men in New York who own the majority of the stock in the Manhattan and New York gas companies; men rolling, wallowing in wealth, who conspire in their secret caucus to punish the people because *they* (these men) are so rich. To a country gas company, whose product is small, the tax is five cents per thousand cubic feet, while to the city companies, whose product is immense, the tax is fifteen cents per thousand cubic feet, so that the city residents are absolutely punished for the exorbitant profits which the city companies are rolling up.

We say that the minds that conceived, the tongues that advocated, and the hands that perpetrated this outrage upon the people, are a disgrace to their possessors. Here are corporations making over one hundred per cent. per annum profit, dividing annually from twenty to thirty per cent., and investing the remainder in additional works, unwilling to bear the least share of the nation's burden.

Here are men professing to be good citizens playing the Pharisee to their less wealthy neighbors, committing a mighty outrage upon Congress and an untold wrong upon their fellow-citizens. The fact is, the day has arrived to put a stop to these mammoth monopolies. The Common Council of this city has already determined to try the right of the city to assume the charters of these companies, and we hope they will do it. The gas which we now burn can be made, *is made*, for less than $1.15 per 1,000 cubic feet, *first cost;* from that deduct the sales of coke and tar, and the cost of the gas is reduced to a good deal less than $1. *Will the New York city gas companies dare deny this?*

New York is large enough for half a dozen gas companies. Let us have them. The Metropolitan (opposition) is going on rapidly to completion, and there is room for two or three more.

The stock of the Manhattan Company is selling at seventy per cent. above par; that of the old New York at one hundred and twenty per cent. above par. The Brooklyn concern has got a spicy little opponent in the Citizens', which will take care of the spare premium on the stock of that company.

This JOURNAL is the organ of the gas-light interest in its broad, public-spirited, fair-dealing sense; but it is no friend to, and no organ of, selfish, sordid men, who refuse to assume their fair proportion of a public burden, who have the unblushing impudence to foist upon Congress a provision to enable them to sneak out of that responsibility and secure them in their monstrous gains by robbing the poor and working classes. But they will soon have their deserts.

The Harlem, N. Y.; Citizens', Brooklyn, N. Y.; New Bedford, Mass.; and Philadelphia (city works) pay their own tax.

ANSWERS TO CORRESPONDENTS.

J. A. P., of Pa.—*Never allow yourself to be imposed upon by judging of a process when worked only on a small scale. The whole apparatus you speak of is entirely too small to give practical results. Wait until the inventor can show you a village, or a factory, or other large building, where you can see the operations at any time, and not only when run for the especial accommodation of visitors. Many parties who have been led into unfortunate speculations now regret not having followed this course, and others would do well to profit by their experience.*

F. J. C., of N. Y.—*The Breckinridge cannel coal which is found in Kentucky, we believe to be the best coal of the kind in the world. If it could be easily transported here, it would have a large sale.*

J. H. R., of Mass.—*You will find the address of the makers and agents of the best clay retorts in our advertising columns. They will furnish you with full directions how to set them. We think you are making a move in the right direction.*

B. B. & Co., of Ohio.—*We will have to send to Europe for a copy, which may consume about six weeks. None can be obtained here.*

W. C., of C. E.—*Have received your note, and will forward the documents by mail. We would be glad to hear of the success of your project.*

A. J. D., of Md.—*It will appear in our next number. We will attend to your request, although you may have to wait until a more favorable opportunity occurs.*

ADAMAS GAS-BURNERS.—The Adamas gas-burners, introduced br Mr. Leoni, have proved very successful. The inventor has lately adopted the same material to machine bearings, and with the same satisfactory results as attended their use for gas-burners. It is anticipated that Adamas steam-cocks will shortly come into use, and that many other applications will be of this substance, the almost indestructible nature of which admirably adapts it for use where iron would become speedily oxidized or worn away.

THE ELECTRIC LIGHT FOR STREET LAMPS.—Serrin's apparatus for street lighting, by means of elictricity, has of late formed the subject of an interesting lecture by professor Pepper, at the Polytechnic Institution. The lecture was illustrated by Mr. Serrin's apparatus; and the inventor himself conducted the experiments. According to the lecturer, Mr. Serrin's improvements promise to effect the long-desired object of producing a sustained light, which can be depended on; the apparatus is what he calls automatic, or takes care of itself, so that the charcoal points, after the battery is once charged, are retained at a measured distance apart, and consumed in the proportion of twenty-two of the positive, to ten of the negative. For streets, the light was exhibited with Defries' prismatic lanterns, and with ground glass; thus giving a diffused and pleasant light. Mr. Serrin has received the medal of the International Exhibition.—*London Builder.*

THE TAX ON GAS CONSUMERS.

COMMENTS OF THE PRESS.

The daily press have much to say in reference to the unpatriotic course of the New York and Manhattan Gas-Light Companies, in adding the war-tax to the bills of consumers. We give the following extracts as specimens of the spirit of the press on the subject, and of the unanimity which prevades the opinions of all.

[From the *Herald.*]

We have received the following circular from the New York Gas-Light Company:

GOVERNMENT TAX ON GAS.

"OFFICE OF THE NEW YORK GAS-LIGHT CO., August 1, 1862.

"In conformity with the act of Congress, the United States tax of one and a half cents per hundred cubic feet will be added to all bills for gas consumed after the first day of September next.

"THOMAS K. LEES, Secretary."

It is rather cool on the part of this wealthy company to try to make believe that their increasing the price of gas is 'in conformity with the act of Congress.' They shift the matter from their own shoulders to Congress. There is not a syllable in the act that directs or authorizes them to make the consumer pay the tax. The pretence is transparent humbug. They are bound to pay the tax themselves, and they can well afford to do it, as they charge to much already for gas. Their profits are enormous, and out of them the tax ought to be paid, instead of shifting the burden upon the consumer. We have no doubt that some of the stockholders have taken an active part in bringing about the war, and that is another reason why they ought to pay for their own whistle. It is a mean piece of business on the part of the company to saddle this tax upon their customers.

[From the *Times.*]

"Monopolies," it has been said, "as they are necessary evils, require in the interest of the people to be jealously watched and wisely kept under stringent control." If the Manhattan and New York Gas Companies had wished to invite the legislative application of this maxim to themselves they could scarcely have adopted a more effective means than by their recent attempt to charge the war-tax to their customers. Their issue of the circular, in which the modest proposal is announced, has thus rendered a service to the city, which, in the prospective depression of all kinds of business, is, no doubt, fully appreciated and will elicit in due time a fit response.

It will be remembered that in the year 1856, illuminating gas having been for some time supplied to our citizens at the extravagant rate of $3 per thousand cubic feet, was, by the relentless pressure of public opinion, reduced to $2.50; so that the price might more nearly correspond with that current in our other large cities. The six years which have since elasped have matured the art of gas-making to higher perfection, and while greatly extending the use of this illuminating material, have introduced more economy in its manufacture. European and American Gas Companies, by adopting these saving contrivances, have been able largely to reduce their rates, and the dividends to their shareholders have still been ample.

In New York, on the contrary, a policy less satisfactory to the consumers, and less honorable to the companies, has been allowed. These corporations have amassed a large and rapidly growing capital, and, in employing it, they have certainly displayed the most vigilant enterprise. Every improvement of real value has been adopted as soon as made. Every new discovery or economical invention has been pressed into the service. But the vast savings thus realized have not been shared with the public. Concessions in price, though often urged, have been as often resisted. The profits of the business, it was gravely stated, would permit no reduction, and thus the manufacturers grew rich while the public was wronged. By an adroit use of the powers loosely intrusted to them by the Legislature, the gas companies have compelled us for years to pay considerably more than is charged in Philadelphia and Boston. The most sanguine director of these flourishing corporations, however, could scarcely have deemed it possible much longer to have sustained a scheme so unjust to the people and so gainful to themselves. Still, with an unaccountable

lack of their characteristic shrewdness, they have taken the pains, by the recent circular, to set themselves in new hostility to the public, and have demonstrated, once for all, that a fair reduction in price is no longer to be looked for from their voluntary action. It now therefore remains for our citizens to take, as speedily as possible, the necessary measures for their own protection. For the price of gas is entirely in the power of the people. In England, and in some of our States, the maximum rate is prescribed by law. The same plan would long ago have been adopted by us, but for the frequent promises of the gas companies to reduce the price, aided, perhaps, by that gentle potent magic, which keen, rich operators too well know how to summon, and to use at Albany. Now, however, the case is entirely changed. Legislative action is imperative. Further delay is impossible. We have no course open to us but to instruct our representatives early in the coming session to introduce and press forward a bill, giving the public the same control over the gas companies, and the same freedom from exaction and oppression, which are enjoyed elsewhere. Two dollars per thousand cubic feet would be nearly double the rate charged in London, and it is stated by men of large practical experience, that this would be an amply remunerative price, and might safely be fixed as the maximum limit to be allowed by law.

[From the *Times* Money Article.]

The conduct of the gas monopolies of this city—the New York and Manhattan Companies—in attempting to throw the burthen of United States taxation upon their consumers, is generally, if not universally condemned. It is an exceedingly mean and contemptible proceeding, and, if presisted in, we hope the city councils will resume the grants of both companies, as, we understand, they have a right to do, under their charters. The truth is, the law in reference to the manufacture and supply of gas, should be made as general in this State, under the Constitution of 1846, as the law for the creation of banks, railways, insurance companies, and ordinary manufacturing corporations. The monopoly in gas, which has been tacitly, rather than rightfully tolerated for fifteen years by the public and the State Legislature, will now unquestionably be arrested, if the imposition of the Federal tax upon the consumers instead of the corporations, be presisted in. The extortioners of the New York and Manhattan establishments will find themselves confronted by the next Legislature with half a dozen new and competing corporations. The Citizens' Gas Company, of Brooklyn, have very properly intimated to their consumers that the Federal tax will not be added to the price of the gas furnished. The old Brooklyn Gas Company have not determined whether they will adopt the same honest principle, or shield themselves behind the example of the New York Gas Light Company, which company, to add to its miserable duplicity, pretends that the law of Congress expressly enjoins the tax upon the consumers, in place of the manufacturers, which is simply false.

[From the *Times*.]

We see that the Philadelphia Gas Company has refused to avail itself of the clause in the Excise law authorizing the companies to levy the tax on their customers. This is but right and proper. It is notorious that the clause in question was smuggled into the bill by a few of the principal gas companies, who spent some of their immense profits in securing its passage. No member of Congress would otherwise have dreamed of recommending such a provision, the prices charged by the companies for their gas being already as high as can be borne by the consumer, and fully one hundred per cent. higher than the rate at which it is furnished in the leading European cities. The New York companies are at the present time dividing two hundred per cent. annual profit, on the amount of their capital, and yet they have the impudence to call upon the public to shoulder a tax which should come out of their own pockets.

It is now too late, we fear, to get Congress to revise the clause by which the companies have been armed with this power; but there is a way of preventing them from using it. When the Legislature meets, let a combined effort be made by consumers to obtain the repeal of the charters of all companies that put it in force. Plenty of capitalists would be found ready to bid for these valuable privileges, even on condition of paying double the amount of tax that the companies are now trying to shirk. We are of opinion, however, that it would be better to vest the rights held by the latter in the corporation, with a view to its supplying gas to the public, as it now supplies water, or at all events, to its giving it full control over the companies. It is only in one of these two ways that this prime necessary of civilized life can be kept within the reach of all. The consumers are sufficiently powerful as a body, to compel the adoption by the Legislature of either of these suggestions; and if the notices issued by the companies are persevered in, they should at once take action in the premises.

[From the *Evening Post*.]

The gas companies of this city are corporations of great wealth. Their profits are enormous; their stock is in few hands, and is rarely to be bought, and then only at prices which show the extraordinarily profitable nature of this monopoly. The New York Gas Company's stock brings over two hundred per cent. when sold. There is no doubt that the companies could afford to furnish gas to our citizens at a rate considerably lower than that now charged, and still make great profits.

But instead of this, these companies actually propose to raise the price of gas, already very high. Under the national tax law, gas companies are taxed from five to fifteen cents per thousand cubic feet, according to the amount made by them. The clause of the tax-law laying this impost, reads most curiously, and in its present condition, seems clearly unjust and absurd, and probably unconstitutional, because it lays a variable duty, and then authorizes this to be charged to consumers. Gas companies producing "not above five hundred thousand cubic feet per month," are to pay only five cents per thousand cubic feet; those producing "not exceeding five millions of cubic feet per month," are to pay ten cents; and "where the product shall be above five millions, fifteen cents per one thousand cubic feet" is levied. Now, so far, it is evident that those who drew the bill, intended to lay this tax on the gas companies as an impost on their revenue, which probably every member of Congress knew to be in general, inordinately great, and of course great in proportion to the amount the company produced, which made the discriminating scale eminently just. But in the very next sentence, it is provided that "all gas companies are hereby authorized to add the duty or tax imposed by this act, to the price per thousand cubic feet on gas sold." Now, this looks to us very much like an unskilful interpolation, smuggled in while the bill was undergoing revision. For, what justice or propriety is there in exacting of Smith, living in Poughkeepsie, five cents additional on his gas, and making Jones, in New York, pay fifteen for the same amount, of the same article. If Congress should enact that people living in one part of the State or the country should pay three cents per pound duty on sugar, and those in another part six cents per pound, there would be an outcry at once. But in the matter of gas, which is almost as much a necessity of life as sugar, we, of New York, must pay according to this absurd enactment, not twice, but three times as much as our friends in the up-river towns.

Why should Congress make such a discrimination? Clearly, it never meant to; it meant to tax not the consumers of gas, but the monopolists who produce it at an immense profit; and it very justly enacted a sliding scale, in order to tax those companies most heavily, who, in the nature of things, having the greatest demand, make the most enormous profits. But by some jugglery, the fruits of which have been unskilfully hidden, the gas companies slip out of the tax-gatherer's grasp, and with refreshing impudence, hand over the public to be mulcted in their stead.

They have the letter of the law on their side at present. But Congress meets in a few months, and one of its most important duties will be a thorough revision of the tax bill. We count it certain that then the public will be relieved from a burden put upon it by these selfish monopolists, who have shown themselves just in time to arouse their victims to appeal for justice. Between this and the meeting of Congress, it is the duty of gas consumers to take measures for exposing this evident error in the tax law.

The policy of public corporations, such as gas and railroad companies, diverting the burden of taxes entirely from their own shoulders, is questionable. But it is a gross outrage to attempt to increase private profits under the pretext of the internal tax. The Brooklyn city railroads are about to attempt something of this kind. They have given notice that henceforth they will sell tickets only at the rate at which single passages are sold—five cents. They thus stop all commutation arrangements, but claim that they have not really raised their rates. But half—probably two-thirds—of the customers of these roads, commute by the purchase of tickets; and the companies, under pretence that they are only adding the duty to the rates of fare, are in reality preparing to pocket a very handsome sum, to add to their already ample dividends.

The Brooklyn city railroad companies are in the power of the corporation of the city. They can be made to lower their general rate of fare from five to four cents per passenger, the rate at which they originally agreed to run. If they show a greedy spirit, they will arouse a public sentiment in the community which will force the city corporation to bring them to terms. They have the right under the late Act of Congress, to charge the tax to the passengers; but the city government has also the right to cause them to lower their general fare; and if they insist on this unfair levy on the public, that will protect itself even if the railroad companies loose by it.

[From a correspondent of the *Evening Post*.]

"I perceive by an advertisement of the Manhattan Gas Company of this city, that from the first of September the tax of fifteen per cent., instead of being paid by the company, is to be levied on the consumer (the customer of the company). I hope every citizen will feel as I do at this outrageous act on the part of the company. The amount of it is this, that this company does not intend to bear one cent of the burden cast on the citizens by the tax and the war. Let us look at it and see whether this is just. A great corporation, possessing, by the favor of the citizens, an immense franchise from which its stock has risen to nearly two hundred per cent., contending for and exercising a monopoly over this great city, yet refusing its share of contribution to the country, by seeking to throw its burden on those who have made it what it is! PLEB."

[From the *Scientific American*.]

GOVERNMENT TAX ON GAS.

OFFICE OF THE NEW YORK GAS-LIGHT CO., August 1, 1862.

In conformity with the act of Congress, the United States tax of one and one-half cents per hundred cubic feet, will be added to all bills for gas consumed after the first day of September next.

THOMAS K. LEES, Secretary.

The above notice has been left at our office and at the dwellings, stores, shops, and offices of all gas consumers in this city. Now, we object to the Gas Companies in this or any other city transferring Government tax from themselves to the consumers. It was not the intention of the framers of the law that the consumers should pay this tax, but that the companies who furnish the gas should pay it as their proportion of the income tax. If the consumers are obliged to pay the tax, the Gas Company is relieved from the assessments which nearly all other classes in the community are unable to shirk.

THE BOARD OF COUNCILMEN ON THE SUBJECT.—At a meeting of the Board of Councilmen of this city, held on Monday, September 8, the following preamble and resolution were presented by Mr. Jones:

Whereas, The Manhattan and New York Gas Companies have notified the consumers of gas in their respective districts that, on and after the 1st day of September, 1862, there will be an additional charge of fifteen cents on the thousand feet of gas; and

Whereas, It is no more than just that the Gas Companies should pay their proportion of the tax imposed upon them by the Government to support the war, and not endeavor to saddle the amount that they should pay upon the consumers, as they are already overtaxed, and are now contributing their means to suppress the rebellion and vindicate the honor of the country; and

Whereas, It is a well-known fact that the Gas Com-

panies declare an annual dividend from 25 to 35 per cent. on the amount of capital invested, their stock being at the present time selling at high rates of premium; therefore,

Resolved, That (if the Board of Aldermen concur) the Counsel to the Corporation be, and is hereby authorized and directed to prepare the necessary papers to make a transfer of all the rights and privileges of the New York, Manhattan, and Harlem Gas-Light Companies to the city, in compliance with the provisions of their respective charters.

After some debate, in which it was stated that the Harlem Gas Company did not propose to charge the Government tax of 15 cents per 1,000 feet to consumers, the Harlem Company was stricken from the resolution, and as amended the preamble and resolution were adopted.

[From the Philadelphia *Press*.]

There is a rebellion in a domestic way in New York. The Tax Bill having put a small tax upon gas, the Manhattan Gas Company has "improved the occasion," by putting on an additional charge of 15 per cent. per thousand feet upon every thousand cubic feet supplied after September 1. The New Yorkers justly and indignantly consider that this is a shabby, selfish, and unpatriotic way of shifting the tax from the company to the consumers—of evading the common contribution to the revenue of the country. Some wards have announced indignation meetings, and the feeling is very strong. Considering that every where on this American Continent where gas is used, the profits to the proprietors are *enormous*, (to say nothing of overcharges,) it is not too much to expect that they will pay the tax out of these profits. We have not heard what is intended to be done in Philadelphia.

THE LENOIR GAS-ENGINE.

[From the *Annual Retrospect of Engineering and Architecture*.]

Much attention was drawn in the latter portion of 1860 to the method proposed by M. Lenoir, of Paris, for the purpose of obtaining power, in positions where steam-boilers could not be erected, by the expansion of the gases evolved by the combustion of ordinary coal-gas, when the latter was burnt in a receptacle specially constructed for the purpose. Many attempts had previously been made to secure this object before M. Lenoir undertook to solve the problem it involved, and, amongst others, the pumping machinery of the Croydon Canal may be cited; but they had all proved to be commercial failures, and of late years the attempt to derive power from this source had been abandoned. M. Lenoir's gas-engine was, however, presented to the world under the auspices of scientific men of such established reputation, that it inspired at once great confidence in the minds of the unprofessional world, and many engines upon this system were ordered in Paris. Practically, they have been found to be as unsuccessful as the more ancient machines of the same description, and have given rise to much ill-feeling, litigation, and loss; and, as M. Tresca has published, in the "*Annales du Conservatoire des Arts et Metiers*," a series of experiments on the actual working of Lenoir's gas-power engines, it may be desirable to notice them briefly, especially as they were conducted with great care and skill, and it is to be suspected with rather a favorable bias for the invention.

The machine experimented upon was made by M. Marinoni; it had a piston of 0.18 m. (7.08678 in.) diameter, and 0.10 m. (3.9371 in.) stroke, so that the area of the cylinder was equal to about 6.274482 feet superficial, and the capacity was about 155.62 cubic inches. In these engines, a portion of the stroke of the piston is used to draw into the cylinder definite proportions of atmospheric air and coal-gas, through certain orifices in the slides. When these orifices are closed by the movement of the slides, an electric spark causes the mixture of gas and air to explode, and increase of temperature more or less considerable is the result of this explosion, and of the combinations to which it gives rise; the heated gases thus acquire an increased pressure, and by its means they drive the piston to the end of its stroke. When the latter reverses its motion, the gases escape into the air, and the same effects as those before memtioned are reproduced on the other side of the piston, the machine having a double action, and the explosion being alternately produced on either side of the piston. The orifices of admission are so arranged as to cause the air and the gas to enter in parallel strata; and the escape of the burnt gases takes place through special orifices, on the opposite sides to the orifices of admission. In order to prevent the cylinder from becoming too hot, a current of water is allowed to circulate round it, and to pass off by a cock placed near the grease-cock. The explosion of the gases is effected by means of a Bunsen's battery of two elements; the wire is put in connection through one of its poles with an isolated conductor, whose connection with two plates of copper is established at the proper moment by means of a thin plate of the same metal working constantly against this conductor. This thin plate, and the wheel which carries it, follow the movement of the piston, and to some extent they form part of it. As to the two copper plates, they communicate respectively with two wires, terminating one in each chamber of the cylinder, at the inflamers. The latter are formed of platinum wire isolated in the axis of a bolt, by means of a porcelain tube, and of another wire of the same metal communicating through the button with the metal of the cylinder, which in its turn forms one of the poles of the circuit, whilst the other ends at the isolated wire. Directly contact is effected between the thin copper plate and the corresponding plate of the battery, the spark is given off from the two wires, and inflames the explosive mixture, and the various arrangements are so combined that the explosion shall take place when the piston has travelled over half the length of its stroke. In the experiments made on this machine by M. Tresca, the gas was measured by an ordinary stamped meter, a dynamometrical lever was applied to the engine to ascertain the power actually produced, and the number of revolutions of the first motion-wheel counted by a stop-watch.

The first experiments were carried on during 3 h. 32 m. consecutively, after allowing for stoppages, but the number of revolutions per minute varied very considerably; the extremes being 140: 102, and the mean somewhere about 130 : 67. The length of the lever of the dynamometer was 4.1 feet, the load on the scales was about 5.51375 lbs., so that the effective work produced by the engine in the 60 seconds was equal to about 0.57 of a horse-power; in the period when the number of revolutions per minute was 129, the power exercised was only 0.56 of a horse. The consumption of gas, per horse-power per hour, when the engine was moving at the rate of 130.67 revolutions per hour, was 122.8 cubic feet; at the slower rate the consumption was rather smaller, but M. Tresca assumed it to be, on the average, about 106 cubic feet per horse-power per hour; the coal-gas formed about one-tenth part of the total volume of the explosive mixture, and it seemed to be entirely consumed. The water which circulated around the cylinder absorbed half the heat which was thus developed; the lubrication of the engine, it is also to be observed, required very great attention, and it gave rise to the consumption of a very large quantity of oil. Before the machine could be set at work, it was necessary to make the fly-wheel revolve several times; the speed of revolution, as was before said, was very irregular; and the non-explosion of a single admission of the gas was at any time sufficient to stop the machine. M. Marinoni thought that in practice it would be better to cause the explosion to take place a little before the gas passages were closed.

The second experiments were tried upon a machine made with extreme care, and having a cylinder of 9.45 in. diameter, and 4.72 in. stroke. The gas was passed from the main into a small holder, containing about 10.6 cubic feet, and thence through a meter registering within limits of error of 2 per cent. With this engine, the effective results were about equal to one horse-power, and the rate of consumption was, on the average, 97.12 cubic feet per horse-power per hour; but the proportion of gas to the atmospheric air in the explosive mixture was only about 0.075 in this instance. The greatest dynamical results per revolution seem to have been produced when they took place at the rate of 80 per minute; but the greatest aggregate result was obtained when the revolutions were at the rate of about 107 per minute. There were marked differences in the times of producing the explosion, and this irregularity was the most apparent on the side of the cylinder nearer to the main shaft of the engine. M. Tresca infers, from several facts which occurred in the course of his experiments, that there were some causes at work which retarded the transmission of the spark; and he considered that 100 revolutions per minute was the maximum number which was desirable. The pressure recorded was, at the maximum, 5.36 atmospheres; and the diagram drawn by the indicator showed that it sank very rapidly after passing the maximum point—a fact which may serve to explain the short stroke given to the piston; it also proves the necessity for paying great attention to the point of transmission of the spark. A series of very elaborate analyses of the gases resulting from the explosion was made under the superintendence of M. Boussingault, and from them it would appear that the combustion of the original gases is effected in a very perfect manner. The temperature in the cylinders was not less than 464° Fahr., that of the gas escaping was still about 308° Fahr., so that the consumption of water for the purpose of cooling the cylinder was at least 26.40 gallons per horse-power per hour, or, in fact, about four times as much would be required for the service of a high-pressure engine of the same power; a condensing-engine, however, would require about 3½ times as much water as the gas-engine. Possibly the water thus heated might be made to render some service, and thus to diminish the cost.

The latter important element in the commercial value of a source of power was estimated by M. Tresca, upon the basis of the prices paid in Paris, to be 0,832 fr. per horse-power and per hour; whilst the fuel required for a high-pressure steam-engine, burning 6.6 lbs. of coal per horse per hour, would be 0.12 fr.; and that required for a condensing-engine, burning 4 lbs. per horse-power per hour, would be only 0,072 fr. But, in addition to this, it is to be observed that the great heat of the cylinder burns the oil with such rapidity, that a considerable additional expense is thereby caused, amounting to about 0.10 fr. per horse-power per hour, in the case of the second machine. The expense of the electrical battery is but small, and, in this instance it was only 0.015 fr. per hour; a more serious inconvenience, however, consisted in the necessity for frequent examinations, cleansings, and repairs of the engine, and in the absolute necessity for employing workmen of the most intelligent and therefore costly description to direct its working. M. Tresca noticed that when the gas-engine was supplied directly from the main, it produced a very distinctly-marked effect upon the neighboring lights; but that when a small holder was interposed, it was hardly possible to perceive any difference in their illuminating power. The capacity of the intermediate reservoir, according to M. Tresca, ought never to be less than in the proportion before mentioned—that is to say, of 10.6 cubic feet per horse-power per hour.

M. Tresca concluded from his experiments, that although the cost of a horse-power per hour, by means of the gas-power engine of M. Lenoir, was very considerably greater than that of an ordinary steam-engine of the same power, there were still occasions in which the former might be very advantageously used. In many trades it is desirable to have at command a power which can be set instantaneously in action, and as instantaneously stopped. The gas-engine certainly possesses this advantage; and if in practice the vendors of those engines could, for any length of time, maintain the useful effects which M. Tresca was able to obtain from the engines sent to him for trial, they would have rendered great service to many of the minor branches of trade. Unfortunately, the French law-courts prove that this is not the case, and that the efficiency of the gas-power engines is rapidly destroyed. This source of power must, therefore, be classed still as one of the scientific toys of the age, in spite of the high promises which attended its inauguration.

WILLIAMSBURGH, N. Y.—The Williamsburgh Gas Company have notified their customers that from and after the 1st of September, the United States tax on gas will be charged to the consumer. This arrangement the consumers are pleased to regard as unjust, illiberal, and unpatriotic, and the *Tribune* says, a large number have notified the gas company to remove the meters as soon as they please. Fair dealing, patriotism, and kerosene, are in the ascending scale just now.

CHEMISTRY OF COAL GAS.

A Lecture by Dr. Lyon Playfair.

Distillation of Coal.—Showing how the former Waste Products in the Manufacture of Gas have been Economized. Salts of Ammonia, Benzol, Tar Colors, &c.

I must now make a little recapitulation of our last lecture, and show you the manner in which its waste products are applied to useful purposes. I explained to you that gas was produced by the distillation of coal; that for a long time the thoughts of manufacturers were applied only to the first purposes for which coal was used, namely, the production of the gas; and that all the substances which are accessory products were looked upon in the light of concomitant evils, the tar and water being waste products, which were inconvenient, and to be got rid of by the most ready methods. Long ago, in the 17th century, Boyle wrote an essay entitled "Man's Great Ignorance of the Uses of Natural Things; or, that there is no one thing in nature whereof the use to human life is thoroughly understood." This truth of the seventeenth century is still a truism in the nineteenth century, the whole progress of manufacture being merely an illustration of it. Substances which to-day are the most useless, to-morrow become embraced within the circle of industrial utilities. It is quite true that there is no one substance in nature of which we know all its properties, or all the uses to which it can be applied for the purposes of common life. I take Boyle's old title as the text for our discourse; but I have only time to give it a very limited application, by describing the utilities now derived from tar, although time will not allow me to embrace them all in one lecture.

You will recollect what were the waste products of the coal-gas manufacture. You will find the products of the distillation of coal in the first diagram on the gallery. First, gaseous products were produced, part of which were useful—the diluents and illuminants; part were impurities, and were got rid of by certain processes. Even these impurities are in some cases now applied. After that there was the crude coal-oil, which is commonly called tar; and then there was a watery portion which contained salts of ammonia. We, therefore, had the gaseous products, the crude oil or tar, and the watery distillate. All except the gaseous products were regarded as impurities—waste substances which were got rid of, and the getting rid of which was a serious undertaking to the gas manufacturer; and I wish now to show you how all these have been utilized.

We begin with the gas water, the badly-smelling, black, ugly gas water of the gas-works, and see what has been obtained from it. The gas water contains salts of ammonia. These salts of ammonia, except in one instance, consist of the base ammonia united with volatile acids, sulphuretted hydrogen, and carbonic acid in the other. A certain quantity of chloride of ammonium, or ammonia in union with hydrochloric acid, is also found in the gas water. The value of these salts of ammonia was long known before they were extracted from the watery waste product of the gas manufacture. In fact, ammonia derives its name from one of the titles given to Jupiter, "Jupiter Ammon," near whose temple in Upper Egypt ammonia was for many generations manufactured from the refuse of camels, which was taken and heated and distilled, and gave off ammonia or some of its salts. Hence its name. Its uses were familiar in this country, and and its applications to manufactures were known long before persons thought of extracting it from gas water. After a time, chemists found sulphide of ammonium and carbonate of ammonia in the watery portion of the coal gas distillate. This distillate gives a very abundant source of ammoniacal salts, and, in fact, the source from which it is now almost all derived. As, however, the subject of to-day's lecture, when we come to the colors produced from coal-tar, wholly relates to the characters of ammonia and the base which is in these salts, I must be permitted, with the excuse of the many chemists whom I see present, to tell those who are not necessarily chemists what ammonia is, and what are its peculiar characters.

The general character of ammonia is probably known to you all. Here is a vessel containing it. It is, as you will see, a colorless gas. It has a very pungent smell; it has an alkaline character; and it is extremely soluble in water. Mr. McIvor will now agitate a portion of this with water, and then you will see how soluble it is. Its alkaline character I wish to explain to you for a moment. An alkaline character is the character possessed by certain bases, such as soda and potash, and a trivial feature of it, but a very important one, is, that it renders reddened infusions blue. I have got here the alkali soda, and if I add it to a reddened vegetable infusion, you see the reddened vegetable infusion becomes blue. This is an ordinary character, and apparently a trivial matter, but still an important one. Now we will agitate this ammonia with water, in which it is partly soluble, and we will admit the water into it, and you will see how it rises. You will observe, at the same time, that this red matter as it rises becomes blue. It is so exceedingly soluble in water, that the water dissolves the ammoniacal gas; and its alkaline character is shown to you very distinctly by the red color of this red water becoming strongly blue just as this fixed alkali soda or potash rendered it blue. Observe how extremely soluble this alkaline ammonia is. You see the water absorbs it so completely that we are obliged to add more water in order to fill the tube.

It is the character of an alkali to unite with an acid. An acid with which it forms one of the most economical salts of which I have to speak is muriatic acid. Here I have some muriatic acid—colorless, like the ammonia, but yet possessing very different properties. You see in this case we have got this water blue instead of red, and we will now remove our vessel and agitate it in the same way. We introduce a little of the water and shake it up, so as to dissolve some of the muriatic acid, which is of a different character altogether from muriate of ammonia. And now we pass it back into the basin of water colored blue. The other was red and became blue; but now the blue becomes red, from this gas being an acid—having an acid instead of an alkaline character.

Now, I wish to show the effect when these two gases are mixed. We must allow a little time for the completion of the experiment. I have here some ammonia, and I will place a flame below it; and in the other retort I have an acid, and I will place a light below that also. This is muriatic acid. When both of these are heated we will bring the vapors into contact. You will see then that the muriatic acid will unite with the ammonia, and produce a substance which is exactly the same, although not in such a solid form, as this ammonia [referring to a large white block of that substance on the lecture table]. It is hydrochloric acid and ammonia which form this solid cake in the manner in which it occurs in commerce.

How completely, you will see, this shows the deductive character of chemistry. Chemistry, in its present state, is not an inductive science; it is a deductive science. It is a science taught to us by experiment.

These liquids are now nearly boiling, and we will pass the two gases into this large tube. [The vapors of the ammonia and the hydrochloric acid were passed through separate tubes up into a large glass globe, and there allowed to mix.] They are now joining one another, and they are forming this solid white muriate of ammonia by their union. You see how this solid body is formed from two gases, a result which could not have been predicated by any science, and is only taught to us by experience.

Having explained the preliminary points to you, I now desire to show how salts of ammonia are manufactured in the arts. When a ton of coal is distilled, above ten gallons of the watery portion comes over from it—ten gallons from Newcastle coal. This contains sulphide of ammonium and carbonate of ammonia. Now, sulphuretted hydrogen and carbonic acid are both volatile substances. It is, therefore, only necessary to add a strong acid to obtain whatever salt we please from these compounds of ammonia. Muriate of ammonia is manufactured in this way:—The gas liquor is run into a deep cistern. This cistern is connected with a chimney, and there is poured into it muriatic acid. That muriatic or hydrochloric acid expels the sulphuretted hydrogen and the carbonic acid, and forms muriate of ammonia in solution. The bad-smelling gas, sulphuretted hydrogen, which smells like rotten eggs, is passed up the chimney, and removed from the locality of the works, to be given to people living at a distance. The muriate of ammonia is placed in a pan containing about 1,500 gallons, and evaporated till strong enough to crystallize. The muriate of ammonia obtained in this way is impure, and has to be sublimed in order to be obtained in this state. This is a piece taken from the top of the retort. After that it is removed to a still of this kind—an iron pot surrounded by a leaden dome; and here a fire is placed below it, and the muriate of ammonia vaporizes from its impurities, and condenses at the top as a crystalline solid. About 4,000 tons of this muriate of ammonia are made annually in this country from gas water. It is used extensively in making alum, and it is used largely in the process of soldering. For instance, it is employed for preparing tin plates when you are obliged to get the surface of the iron which you are about to tin in a perfectly clean state. You put it in a bath of muriate of ammonia, which dissolves off the oxides which are on the surface, and leaves the iron in a state for soldering. It is also employed extensively in making the more common salts of ammonia.

There is a point in connection with this to which I would direct your attention. I want to show you the peculiar character of ammonium as a metal. Ammonia consists of one equivalent of nitrogen and three equivlents of hydrogen. There seems to be little analogy between this substance and chloride of sodium or chloride of potassium. Chloride of sodium, which is common salt, contains the silvery metal sodium; and chloride of potassium contains also the silvery metal potassium. There seems to be little analogy between a gaseous body consisting of one of hydrogen and three of nitrogen; but I am going to attempt to imprison this body, which consists of four equivalents of hydrogen and one of nitrogen, by amalgamating it with mercury. Here I have a saturated solution of this salt, chloride of ammonium, which chemists are compelled to think contains a substance having metallic characters, although it consists of these gaseous bodies, nitrogen and hydrogen. Here I have an amalgam, or a compound of mercury with sodium. Now, if I pour this amalgam of sodium and mercury into the chloride of ammonium, the sodium takes away the chlorine from that compound, and leaves the ammonium to combine with the mercury. This metal is NH_4. It is one of an evanescent character, and I must imprison it by holding it in the mercury in order to show you its presence. As the ammonium acts upon the mercury it will swell up. It is now swelling. You see it growing in bulk before your eyes. We have the ammonium imprisoned by the mercury, and enabling me to show you for awhile that this substance really has metallic properties, although it will soon dissipate again into the gases of which it consists. You see that it has formed an amalgam, as the sodium did, but, from its gaseous character, one of much larger bulk. In is a semi-solid or butyraceous substance. It can be handled, but it soon breaks up into running mercury and the gases. It is now obvious how the salts of ammonium may be readily made analogous to the salts of sodium and potassium. This body, NH_4, or one of nitrogen and four of hydrogen, is in reality a metal which unites with halogens and forms salts.

I must run quickly over the other salts of ammonia, and I will not enter into the details of the manufacture. For instance, this muriate of ammonia is not manufactured only in the way I have told you. It is manufactured in many other ways which it would tire you to describe. One of them is to take the gas water, and, instead of saturating it with strong acids like muriatic acid, to distil it with lime. The ammonia gas goes over, and is very readily condensed in water. It may be condensed in water or acids, and forms various salts. This process is much the best, as the badly smelling sulphuretted hydrogen is retained by the lime. There is another way of manufacturing this muriate of ammonia by acting upon sulphate of ammonia with common salt; but I will not tire you with all these details and modifications of the manufacture. You must ascribe it not to ignorance, but to the fact that I do not think it necessary to enter into them. I now pass to sulphate of ammonium, which is another salt very much manufactured from gas water. About 5,000 tons of it are annually made in this country from gas water. It is made in the same way, by adding oil of

vitriol to the ammonia of the gas liquid. It is used largely for manure. It is used largely for making alum; and it is employed also for making ammonia, or rather solutions of ammonia in water,—by distilling it with lime, which keeps back the sulphuric acid. Carbonate of ammonia is another salt, and one which ladies use very much in their scent-bottles, and as a diffusive stimulant. It is made by distilling with sulphate of ammonia and chalk. Chalk is carbonate of lime. The carbonic acid goes over to the ammonia and forms carbonate of ammonia. The way this is done in the arts is represented here. I have here a still, or a retort, not at all unlike the retorts which are used in gas-making. Here the sulphate of ammonia, or the muriate of ammonia and carbonate of lime are placed, and they are heated together with fires placed under them, and the carbonate of ammonia, being a volatile salt, is sublimed and condenses in these chambers. It is afterwards distilled again. It sublimes at 177°, which is below the boiling temperature of water. The stills have got leaden caps, and the water heats the impure salt and sublimes the carbonate of ammonia which is afterwards taken out of the cap. This is also very largely manufactured. About 2,000 tons are made annually of this salt. Various modifications of these plans are also used. For instance, the gaseous ammonia is led into a chamber of carbonic acid. The chamber has water at the bottom. The carbonate of ammonia is formed and crystallized, and afterwards sublimed. The aqua-ammonia of pharmacy, or ammonia water, or liquid ammonia, or hartshorn, is made by introducing a base to keep back the acids, and the ammonia is distilled over. This ammonia is used for a great many purposes—as a diffusive stimulant in medicine. It is also used as an antacid in medicine; and largely employed to saturate carbonate of ammonia in ladies' scent-bottles, some aromatic substance being generally mixed with it. Now, look what a transformation is effected by the application of chemical agency; the refuse of camels, the offal of the streets, the fetid water of the gas-works, have become so transformed under the influence of chemistry that ladies preserve them in their scent-bottles as a cherished luxury. You see how these waste products may be used to furnish even luxurious utilities.

(To be continued.)

GAS IN SCOTLAND.—The Stirling Gas-Light Company have expended a large sum on the extension and improvement of their works.

PATENTS.

UNITED STATES

36,192.—Antonio Meucci, of Clifton, N. Y., assignor to Antonio Jané, of Brooklyn, N. Y., for Improvement in Kerosene Lamps:

What I claim is the combination of a plate of platinum (or other metal having the same qualities), with the wick tube of a lamp, substantially as set forth, the said plate being adjustible vertacally.

36,198.—E. G. Tobey, (assignor to himself and Josephus Nash), of Portland, Maine, for Improvement in Kerosene Lantern:

What I claim is, first, The combination of the fastenings, c c, the flanch, a, and the cap, C, substantially in the manner and for the purpose described.

Second, The cap, C, constructed and operating substantially in the manner and for the purposes herein described.

Third, The combination of lantern, A, burner or lamp, B, and cap, C, substantially as described.

36,078.—Christian Dorflinger, of Brooklyn, N. Y., for Improvement in Lamp Chimneys:

I claim, first, The blowing and moulding of glass chimneys for lamp neck, bulb and base, oval throughout the entire length, instead of round as at present done.

Second, The blowing of such chimneys in a mould, which insures perfect uniformity of size and a greater weight of glass, in the manner and for the purposes set forth.

36,079.—Christian Dorflinger, of Brooklyn, N. Y., for Improvement in Lamp Tops:

I claim the making of the top of lamp burners oval instead of round so as to receive and fit all oval-base lamp chimneys, in the manner and for the purpose herein set forth.

36,201.—N. Aubin, of Canada, for Improvement in Water Meters:

I claim the combination of a diaphragm with a reversing apparatus and a short slide valve, connected each with the other without the use of stuffing boxes, and the whole enclosed within a proper receptacle containing a valve seat, and constituting a fluid meter, substantially such as is described, and acting substantially as specified.

I also claim a receptacle constructed in two pieces, one half of which contains part of the side pipe, and the other half the other part thereof, when the joint between the two is made by a diaphragm, and the latter acts on a reversing apparatus contained in one half of the said receptacle; the construction being substantially such as described. And

Lastly, I claim in combination with a diaphragm of a water meter, a short slide vale of less length than the distance from the outside of one port to the inside of the other port, the combination being substantially such as described.

36,203.—J. F. Black and Ambrose Buracker, of Lancaster, Ill., for Improvement in Cattle Pumps:

We claim the platform, C, with the weight, G, attached, in combination with the tubular piston rod, I, of the pump and the trough, O, attached to the platform, arranged substantially as and for the purpose herein specified.

We further claim the railing, M, and cover, N, when combined and arranged relatively with the platform, C, for the purpose herein set forth.

36,205.—W. H. Crawford, of New York City, for Improvement in Reflectors:

I claim a reflector, A, formed of two curved or bent surfaces, B C, with one high central ridge, D, as and for the purpose shown and described.

36,206.—G. Y. Custer, of Norristown, Pa., for Improvement in Coal Oil Lamps:

I claim the reservoir, B, containing a supply of water, and arranged immediately below the perforated air chamber, G, of a coal oil lamp in respect to the wick tube, as and for the purpose herein set forth.

36,222.—Robert Leitch, of Baltimore, Md., for Improvement in Two-way Stop Cocks:

I claim a stop cock for street and dwelling purposes, constructed and operating substantially in the manner and for the purpose set forth.

36,226.—Samuel Marshall, of Wilmington, Del., for Improvement in Lamps:

I claim the attaching of the supplemental cap, D, to the lamp, by means of one or more curved or bent plates, E, arranged as shown, so as to support the cap, D, and admit of it being adjusted higher or lower, to suit the hight of the wick tube, and at the same time admit of the wick tube passing through it at its upper part, to prevent any lateral movmeent or shifting of the cap, as and for the purpose herein set forth.

36,237.—J. W. Schreiber, of New York City, for Iment in Mica Chimneys for Lamps:

I claim, first, A lamp chimney, composed of two conical mica tubes, a a', connected together at their larger ends, and provided with a metal top tube, c, and a perforated metallic base, C, substantially as set forth.

Second, The supplemental draught tube, F H H, with cap, E, attached and arranged as shown, to form two eduction or escape passages for the draught, when said tubes are used in connection with the chimney, B, for the purpose set forth.

36,238.—Thomas Shaw, of Philadelphia, Pa., for Improvement in Blow-off Cocks for Pumps:

I claim the combination of a valve and faucet, when applied to a pump, substantially as shown and described.

36,254.—J. A. Bassett, of Salem, Mass., assignor to the American Steam Gas Company, for Improvement in the Manufacture of Illuminating Gas:

I claim passing superheated steam into a retort containing carbonaceous material partly in an incandescent and partly in a bituminous state, substantially as set forth.

36,262.—Emil Trittin, of Philadelphia, Pa., assignor to David Rice, of New York City, for Improvement in Lamp Burners:

I claim, first, constructing the wick tube of two parts, B E, connected together by the plate, D, and points, c, of the lower part, A, of the burner, with a space, g, between them, substantially as and for the purpose herein set forth.

Second, In combination with the wick tube thus constructed the jacket, G, supported on the burner by the points, d, of the plate, D, as and for the purpose specified.

36,265.—Walter Aitken, of Newark, Ill., for Improved Current Water Wheel:

I claim the arrangement of the horizontal power wheel, A, the floats, a, and the braces, b, as connected with A, in the manner described.

Second, I claim the combination and arrangement of the vertical axis, J, the wheel and axle, B c, the ratchet, d, the cogged semicircle, B, or its mechanical equivalent, for imparting motion to B, with the chain or its equivalent, e, for the purpose of elevating the wheel, A, all constructed and operating substantially as and for the purposes delineated and set forth.

36,274.—John Carton, of Utica, N. Y., for Improvement in Railroad Lamps:

I claim the perforated ring, one or more, or other equivalent material, in combination with the tubes, B' and B, constructed and operating substantially as described.

PETROLEUM GAS.

THE AUBIN GAS-WORKS COMPANY, OF ALBANY, N. Y., have adapted their Works to petroleum and the heavy oil obtained from its distillation. Parties desiring information will be referred to Village Gas-Works thus adapted, where the ordinary yield of gas is from 150 to 200 cubic feet per gallon of oil. This yield, and the great improvements which experience has added to the Aubin Works, enable them to make a rich gas at a low cost—the only way to compete with kerosene.

WOOD GAS.

THE INVENTOR AND PATENTEE of a New and Improved Retort for Manufacturing Gas from Wood, Turf, &c., would call the attention of Gas Companies, and the public generally, to an invention which will be a great saving to the community, as they can thereby supply an exceedingly cheap, clear, and brilliant light, besides useful products in profusion. The Works can be seen in successful operation at the Cremorne Gardens, Fourteenth street and Sixth avenue, on application at the office of the Patentee, No. 23 Liberty street, New York, and where any information may be obtained, and where Companies or private individuals wishing to purchase rights for Hotels, Factories, Private Houses, Cities, Counties, or States, will please apply.

ANTI-FREEZING APPARATUS.

FREEZING OF GAS-PIPES.—Walton's Patent Anti-Freezing Apparatus illustrated by Engravings in the AMERICAN GAS-LIGHT JOURNAL, of Jan. 1, 1861, page 212, is the most simple, durable and efficient of any known process.

See also certificates from Cincinnati, O., and Louisville, Ky. Gas-Works in same number, page

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For the Conveyance of Water, Gas, and Drainage.

This important invention, patented by Mr. Charles Newbold, and now for the first time introduced to the public, may confidently be stated to be one of the greatest interest and commercial value, as the Patent Bituminized Pipes possess all the qualities necessary for the conveyance of Water, Gas, Sewage, Mine-Pumps, &c., viz.: great strength, great durability, and inoxidability, with the immense advantage of being about *one fifth* the weight of iron pipes, and about 35 per cent. cheaper; whilst, compared with lead pipes, the Bituminized Pipes are only about *one fourth* their price, without the possibility of the formation of the oxide and carbonate of lead, so dangerous for every purpose. They will stand 150 degrees of Heat, and after many trials it has been satisfactorily proved that rats or vermin will not touch them. They also withstand the action of all acids and salts.

Iron pipes are at present frequently covered with a coating of bitumen or coal tar before they are laid down; but the adherence of this coating to the metal being very imperfect, on account of vibration and the difference of expansion, this preservation is insufficient, besides being exposed to a number of influences which neutralize its efficacy—galvanic currents materially assist the formation of oxides and deposits, which cause the obstruction and eventually the destruction of metallic pipes.

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Pack the pipes level in the ordinary way; slip the collar over one of the pipes; draw the ends close together and warm them by putting a hot iron between them; then press them together so as to make them adhere; take a piece of iron wire netting, about half an inch in the mesh, a little narrower than the length of the collar, and long enough to wrap once round the pipe, spread the collar over it and the joining; close the ends with clay; pour the melted cement into the manhole of the collar, and fill up the interior space; then remove the clay and the joint is finished.

It is necessary to leave a small vent hole in the clay at each end of the collar to allow the air to escape as the cement is poured in, that there may be no flaws or air bubles in it when cold. If in cooling the cement settles in the manhole, fill up again.

N. B.—The cement should be broken into small pieces and melted in a pot as you do lead, at a low temperature, until it is dissolved; it must be stirred while melting; then take it off and keep stiring it as it cools until it becomes nearly as liquid as water; then pour quickly.

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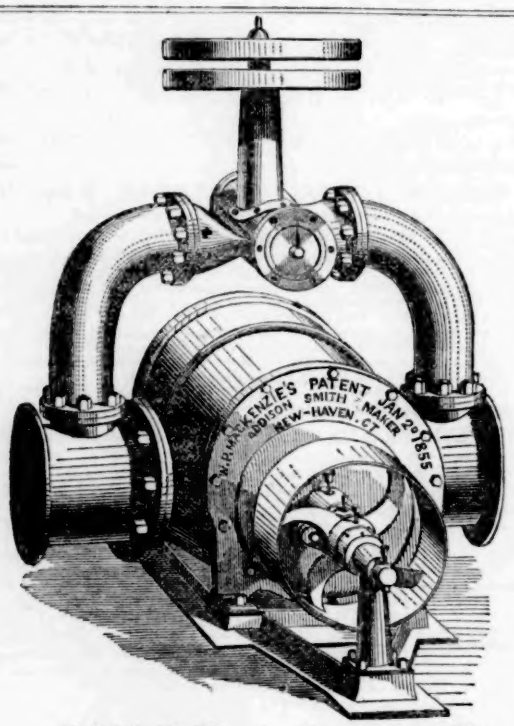

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POTTS' REVOLVING SIGNAL LIGHTS,

PATENTED SEPTEMBER 8, 1857.

Mr. ALBERT POTTS, the well known Inventor of the LAMP-POST LETTER-BOXES, which have been adopted by the Post-Office Department for the large cities of the United States—and also of the GAS METER BOX, to be set in the front walls of houses, thus doing away with visits from Gas Inspectors, or burglars in gas-clothing, has lately brought forward a third Invention, which in point of importance and world-wide usefulness, surpasses the others entirely.

These SIGNAL LIGHTS are intended for use on Vessels propelled by Steam, and those exclusively. They specially indicate the presence of a Steamer, and by their use, there will be less likelihood of mistakes, and consequent collision than at present. They are also intended for SIGNALLING AT NIGHT, and can be used for that purpose UNDER ANY CODE of SIGNALS NOW ARRANGED FOR FLAGS.

This Improvement in Lights for Steam Vessels, consists in having the Lanterns containing the colored lights, connected by means of a series of cogged gearing with some convenient part of the Engine or Machinery, so as to cause them to have a revolving motion around their axis. On side wheel steamers, the Lanterns should be placed directly over the wheel-houses, and the power, or motion to turn them, may then be very conveniently obtained from the paddle wheel shaft. On Propellers, the Lanterns should be placed on each side of the Pilot House, or hurricane deck, and the rotary motion derived from any convenient or suitable part of the Engine or Propeller Shaft. Each Lantern is supported on the end of movable cranes, so that their relative positions may be changed and properly adjusted to suit the view of observers on either side of the vessel at the time of signalling.

The Lanterns to be used in this improvement may be constructed for Burning Oils, Fluids, Gas, or any of the known modes of illumination, and should be furnished with one or more lenses and reflectors, so as to concentrate the rays of light, and project them over the horizon with the greatest intensity. The lenses for this purpose should be made with colored glass, viz., Red and Green, and the position of the respective Lanterns, according to the color of the lenses therein, must be placed on the sides of the vessel so as to answer to the requirements of Rules and Regulations made and published by the Supervising Inspectors of Steamboats, agreeably to the Act of Congress of the United States in such cases made and provided. That is to say—by said Regulation—the Lantern having the green lenses for producing the Green Colored Light, must be placed on the starboard side of the vessel, and the other Lantern producing the Red Light, to be placed on the port side thereof. In pursuance, also, of the aforesaid Rules and Regulations, there is to be found in board and behind each Lantern, a screen to answer the purposes therein mentioned.

The cogged gearing, by which the Lanterns are connected with the Engine or paddle wheel shaft, and thereby caused to revolve when the Engine is in motion, is so arranged that the connection may be readily shipped or unshipped, and the lanterns made stationary or otherwise, at the pleasure of the Pilot, or those whose duty it may be to operate and attend to the same. The cranes on which the Lanterns are placed, are also rigged so as to be readily turned horizontally from one position to another, so as to present one or both lights to the view of observers when laying athwart ships at the time of signalling.

On the Use and Application of the Improvement for Night Signals.

When the vessel is under weigh, or going ahead in its course, the Lanterns are to be placed directly athwart ships, so that such colored light therein will then have the position and place prescribed by Rule Seventh of the aforesaid Supervising Inspectors of Steam Boats, and with the screens behind them, as above described, will then answer all the intents and purposes for which the colored lights are thus required to be used, as illustrated in the several diagrams published by said Inspectors for the working of a system of Colored Lights. The Lights in this case, according to the color seen by the observer, indicate the course or direction of the vessel whereon they are carried. When the Lanterns with the colored lights therein, are made to revolve around on their axis, as proposed in this improvement, in addition to the signal above, another, and as we believe, very important and useful signal is thus formed, indicating that the vessel, whereon it is carried is a Steamer. In dark foggy nights, it is found by experience, to be somewhat of a difficult task to distinguish sailing vessels from Steamers and Propellers, especially when the latter are rigged, and carry a press of sail. When Steamers meet "head and head," it is the duty of each to pass to the right, or, on the larboard side of the other. Whereas, when a Steamer meets a sailing vessel, the former must give way and allow the latter to pursue its course. Hence, to carry out the regulations of the said Steamboat Inspectors, and prevent collisions, it is important to have some infallible sign, whereby the character of the vessel may be readily seen and determined. Several very fatal collisions have recently taken place through mistakes of this kind.

On Signals for Speed and Distance.

The gearing of the Lanterns with the paddle wheel or propeller shaft, may be so arranged as to be an index of their speed. A very good proportion, would probably be to make the Laterns turn about one third as fast as said shaft. Hence, when the speed of the vessel is previously known, when making a certain number of revolutions of the paddle or propeller, it becomes an easy task from observing the time with which the Lanterns thereon may be turning to approximate to the speed with which the said vessel is moving at the time of observation. Again, as the arcs described by the rays of light from each lantern, as they revolve around on their axis, is greater in proportion to the distance from said lantern, so will the time in which said rays move over any given space, be less in the same proportion. Hence, when the lights are very remote, or far off, from the observer, the duration of each column or cylinder, of rays from each lense, would pass the eye of the observer, in a short space of time, or with great velocity. Whereas, at a nearer point of observation, the time of its passage would be considerably lengthened, or the motion thereof apparently much slower. From these facts, we believe the improvement is susceptible of indicating, in an approximate manner, the speed and distance of vessels whereon the revolving lights may be used.

On the Application of the Improvement for Marine Telegraphic Purposes.

The Revolving Lights can be readily applied to the general purposes of Marine Signalling at night, as follows: In order to show this application, we have adopted the Numbers as given in Roger's Code of Marine Day Signals, believing that work to be somewhat of a standard in matters of this kind. Instead of the flags used in the above code, for day signals, to indicate the combinations of two or more letters of the Alphabet, which combination is referable to certain numbers indicative of the words or sentences telegraphed, we propose to perform the same operation, at night, by means of the two revolving colored lights, so as to indicate the numbers directly to which the intended words or sentences to be telegraphed are referable. Thus, whether the vessel to be signalled is ahead, astern, or abaft the beam, the position of the two colored lights must be so adjusted, by means of the moveable cranes, whereon said lanterns or lights are fixed, that the two lights may be fully made visible to the observer. When both lights are thrown into this position, stopping the motion of the lanterns may be the signal for calling attention, or a rocket fired off, or the steam whistle blown, would answer the same purpose. Now, in order to represent the ten numerals, we propose to indicate them by the respective motions of the two colored lights, as follows:

RED LIGHT.				GREEN LIGHT.			
One Red, Represents Number			1.	Two Green, Represents Number			2.
Three	do.	do.	3.	Four	do.	do.	4.
Five	do.	do.	5.	Six	do.	do.	6.
Seven	do.	do.	7.	Eight	do.	do.	8.
Nine	do.	do.	9.	One	do.	do.	0.

In the above arrangement, it will be seen that all the odd numbers are made by the Red Light, and the even numbers by the Green Light. In order to indicate the repeat of the last number, once or more times, or for other special purposes, which may hereafter be found useful and necessary, an even number of lights may be shown by the Red, and an odd number by the Green. It will be understood that when the Lanterns are made with three lenses in them, the numerals as above arranged are formed by the number of times a new light or lense is presented to the observer. Thus to indicate the number 3, the Red Light or Lantern would make one entire revolution; and to make the number 6, the Lantern carrying the Green Light would make two revolutions, and so on with the other numbers. When a symbol is made, the motion of the Lantern is to be suspended for a short time, and when a number expressing a sentence is formed, the lantern may be stopped for a longer period, or some one of the special signals above referred to, may be used for this purpose.

To show the application of this improvement as above mentioned, whereby these Lights can be used as readily for Night Signals, as Flags are used for Day Signals by the author of Roger's Code, we shall use the sign ○, colored red or green, according to the light used, to show the number of movements performed by the respective lights in order to represent any desired number of said code, suitable for the required purpose.

RED LIGHT.	GREEN LIGHT.
○, ○, ○, ○, ○,	
○, ○, ○, ○, ○, ○, ○.	
	○, ○.
	○, ○.

The above would represent the number 5722, and by reference to said Roger's Code, would be found to stand before the sentence:

"WILL YOU SHOW THE NUMBER THAT REPRESENTS YOUR NAME?"

RED LIGHT.	GREEN LIGHT.
○.	
○, ○, ○, ○, ○.	
○, ○, ○, ○, ○, ○, ○.	
	○, ○.

Here the number expressed is 1572, and per the same Code, stands for

"WHERE ARE YOU BOUND?"

RED LIGHT.	GREEN LIGHT.
○.	
○, ○, ○, ○, ○, ○, ○, ○, ○.	
	○, ○, ○.
	○, ○, ○, ○, ○, ○, ○, ○.

The number thus expressed is 1928, and per said Code is

"WHAT IS YOUR CARGO?"

RED LIGHT.	GREEN LIGHT.
○, ○, ○, ○, ○.	
	○, ○, ○, ○, ○, ○.
	○.
○, ○, ○.	

Here the number expressed is 5603, and stands for

"HAVE YOU ANY NEWS?"

(RED LIGHT.)

Fig. 2

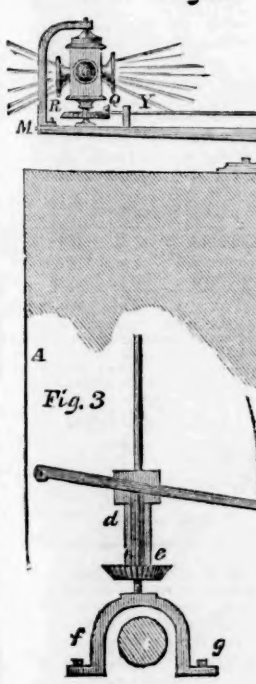

Fig. 3

(GREEN LIGHT)

Fig. 1

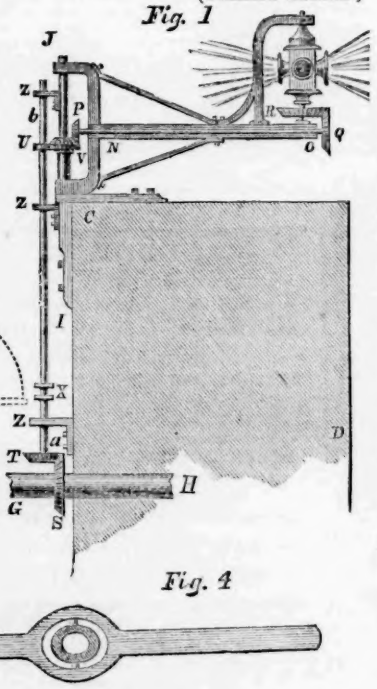

Fig. 4

MECHANICAL CONSTRUCTION.

In our engravings, Figs. 1 and 2, represent Vertical Sections through the wheel-house. In them E F and G H represent portions of the main Shaft. In Fig. 1, I J is a stout Iron or Wooden post, fastened against the side of the wheel-house, directly over the main shaft. On the upper part of this post, is fitted the moveable arm or crane N O, to the main shaft is fitted the bevel wheel S, and to the lower end of the rod a b, is fitted a corresponding wheel T. U is a small pinion on a b, which gears with the spur wheel, V, which in turns gives motion to the wheels, P and Q, and so revolves the lamp R. It will be seen that a Rotary motion is given to the lamp, when the main shaft is in motion and a b connected.

It can be disconnected by a lever, acting between the bosses X, which will elevate the rod in the guides Z Z Z.

Fig. 2 is another arrangement, for the same purpose. In this, K L represent a hollow Shaft, on which is firmly fastened, the arm L M, on which is the lantern. The hollow post is secured to the wheel-house by the straps K and B, and it can turn freely in them, the other part being the same in them as in fig. 1

The lever K W, when drawn down, will turn the frame in any required position around the Shaft c U. In fig. 1, the arm or crane N O, may be operated by cords from the wheel-house, but in this device, the rod c U, does not lift up as in fig. 1, but in its place, the lower end is made square, and on it slides the short tube, d E, shown in fig. 3. The lower end of the rod turns on a bridge, f g, spanning the main shaft. On the upper end of the tube, d e, a lever is attached by means of boxes and collars as shown in fig. 4. This lever when raised carries with it the beveled wheel T, thus disconnecting the gearing apparatus.

ALBERT POTTS, Patentee,
PHILADELPHIA, Pa.

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